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TRANSACTIONS  
OF THE  
BRITISH SOCIETY FOR THE  
STUDY OF ORTHODONTICS.



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# BRITISH SOCIETY FOR THE STUDY OF ORTHODONTIA.

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AN ordinary meeting of the Society was held at 11, Chandos Street, W., on Wednesday, January 13th, 1909, MR. GEORGE NORTHCROFT, President, in the chair.

The minutes of the previous meeting were read and confirmed.

Several members signed the Obligation Book and were formally admitted to membership.

Messrs. J. W. Doherty, L.D.S.Eng., of Wimbledon, and Arthur G. Lacy, L.D.S.Eng., of Surbiton, were ballotted for and duly elected.

The PRESIDENT announced that at the suggestion of the Librarian the Council had decided to keep a Suggestion Book in which members might enter names of any book dealing with Orthodontia which they thought would be an acquisition to the Library.

The PRESIDENT then delivered his Inaugural Address :—

## “ AIMS AND IDEALS.”

To belong to the British Society for the Study of Orthodontia, should be considered by all of us an honour and a pleasure. It is, therefore, feeling doubly honoured and with additional pleasure that I greet you from this dais to-night.

Having written the above words, I thought I would once more read our first president's inaugural address, and found it, as could only be expected, a model for all future occupants of this chair, but it covered so much ground, so well, that there seems little that is original left for me to say. Therefore do not accuse me of plagiarism if many things I say seem but “ the echo of some forgotten dream.”

Our immediate past president,—under whose able leadership we successfully passed through the first year of our existence as a society,—when speaking to you last December, reviewed our work for that year, and the time has come, when, having set our house in order, we look into the future with a determination to hasten the approach of that time, when all problems of development shall have been solved, when every dentist shall be taught, *and think* along the same lines, complicated treatment shall have become

simplified, and our society shall die, having, like Alexander the Great, no more worlds left to conquer.

Much time must elapse, however, before this occurs, at present we are very young and ignorant.

How can we best accomplish our training in this truly Olympian race, which has for its goal a dental millennium? By keeping ever before us those ideals of research and mutual help for which express purpose this society was founded.

The same germ of truth often underlies two opposite points of view, let us therefore seek to harmonise divergent opinions, not waste time over futile dissension, but endeavour to work from established facts already admitted, or establish facts which can be admitted by all. As an instance of the kind of work I mean, let me refer for a moment to a paper recently read by Mr. J. F. Colyer, entitled "Adenoids and the Feeding of Infants in Relation to the Growth of the Jaws," which showed evidence of great thought and much time spent in its preparation, and should be taken as one of the types of how our researches should be conducted.

Research, however essential, is at the same time irksome to many practitioners, and the encouragement of further post-graduate lectures as a concentrated form of gaining up-to-date knowledge, cannot be too highly commended, and should be carefully fostered by our teaching institutions. As earnest students, it should be our endeavour to establish methods of treatment on sane, broad principles, so that while details may vary, our aims will be the same. The writing of two such articles as appeared in the *Lancet* of June 27th, 1908, with such diametrically opposite views, then would be an impossibility, and the medical world, as represented by the editor, would not comment on those views in a one-sided way, being obviously unacquainted with methods, or results, that are "familiar in our mouths as household words."

It is with great pleasure that we can see the time coming, when our treatment shall be based on the sure foundation of etiology, and some of our methods no longer jeered at, as being empirical. A knowledge of *all* methods must be acquired, and a proper understanding of how to apply that knowledge to individual cases.

Every one acknowledges the inter-dependence of cause and effect, and a study of normal and abnormal development seems to be the key to open the way to successful treatment. Dr. Pullen, one of the foremost orthodontists of America, says in the December *Cosmos*, "Occlusion normal, or abnormal, depending on earlier developmental conditions, is not of primary import in the study of orthodontia, since it is governed entirely by certain developmental factors, which precede the perfection of occlusion by several years." We here see a tendency to relegate occlusion to its rightful place, but for many of us it still remains "a basis of classification, as well as a rule of conduct," and its proper appreciation helps us, not a little, in our daily work.

I would here pay a passing tribute to those who have insisted on the study of normal occlusion and its variations, with such force, had its recognition been more universal, a case such as appeared



in a recent number of the DENTAL RECORD would not have been described as "a case as perfect as possible."

The enormous value of good occlusion is recognised in most quarters, although some precocious thinkers argue otherwise, and it is time such points should be settled for ever, and their discussion considered as futile as whether undigested food nourishes the body.

It cannot be denied, however, that the correction of malocclusion as a "be all and end all" of odonto-prosopic orthopædics, has been overdone and the pendulum is swinging back to the normal, but with a vastly increased respect for that important symptom of maldevelopment.

The much debated problem of extraction as a method of correction is still unsettled, and it should be the endeavour of this society to formulate some scheme to define clearly when such treatment is permissible, and when it is positively mal-praxis.

Starting at the very beginning, we hope soon to set before you a new classification of abnormal conditions of the teeth and jaws, which, side by side with others, will give us common ground for study and discussion; we are looking forward to the advent of that philosopher-chemist, who will transmute all our semi-base currencies into one standard golden truth.

The periods of eruption of the teeth in cases of mal-occlusion, departing as much as they do from the accepted normal, seem to need careful revision, and the forces governing such eruption need more careful investigation. In treatment, how often we are hampered by the non-appearance of an expected tooth, which upsets all our nicely balanced calculations.

Let me again appeal to you to take and preserve, through a series of years, the models of young developing mouths, normal and abnormal. In a paper read in November, 1907, before the Metropolitan Branch of the British Dental Association, the lack of series of developing mouths was deplored, and since that time I have been amazed at the enormous number of abnormalities that are foreshadowed in the temporary dentition, before patients have reached the age of five. This condition has never been taught in our schools, even if it has been noticed before, and needs further investigation. Had I my eighteen years of practice to re-live, with my present appreciation of my ignorance, many of these difficult problems of development would be nearer solution.

To this end we must also call in the aid of our librarian, urging him to labour incessantly to make our books of reference, and our exchange of journals increasingly valuable, and, if possible, induce him to select, and have bound, those articles which appear sporadically, likely otherwise to be overlooked, which, when placed together, might add materially to the mass of evidence for, or against, any particular theory.

It is also contemplated to increase the usefulness of the society by the creation of an Investigating Bureau, officered by one of our members, who would aid in research, and the accumulation of details dealing with technique.

Thanks to the courtesy of our landlords, we now have an outlet for the energies of both librarian and curator, and while keeping the Museum for interesting specimens and models, it should at the same time contain examples of all modern appliances, the rightful understanding of which may prove of inestimable value to the harassed practitioner, who, for the time being, may be at a loss how to proceed. It is a consummation devoutly to be wished that the library and Museum should be well patronised in the coming year, not alone by gifts, but above all by the keen interest of individual members.

The use of "X" rays as a means of diagnosis and research has not been overlooked, and an apparatus is being prepared with which it is hoped to obtain *exactly similar* skiagrams of the jaws and teeth before and after treatment. By "exactly similar" is meant, that two plates may be superimposed and only show those differences due to treatment or growth.

Now as well as mutually helping one another in association, and so stimulating our keenness for knowledge, we must individually try to work on some undecided point, committees are all very well, but personal enthusiasm can also accomplish much.

The case cards introduced by Mr. Hedley Visick, and since adapted, and adopted, in my own practice, are recommended to your notice, as great time savers, as well as, enduring records alike, of failure and success.

The careful measurement of the jaws and teeth, keeping accurate records of the work done with times of tooth movements, the ages of patients treated, and keeping models from the very earliest ages, photographs before and after treatment, accompanied by skiagrams, are among the forms of personal energy to be commended for your consideration.

Before bringing these discursive remarks to a close, I would again insist on the necessity of the accumulation of facts, for many a pet theory may be rendered untenable by one awkward, little, practical fact.

I have enumerated just a few points that may be considered worthy of research, and helpful in our busy lives, as enabling us to come nearer to our goal of ideal practice.

We hope we are studying for the ultimate good of the human race, so, though discouragements may arise, and we may sometimes feel inclined to abandon this most fascinating of subjects, on account of its many difficulties, let us remember in the words of a man who has plumbed all the sorry weaknesses of human nature "whatever comes or does not come, we men must not be afraid."

It now only remains for me to wish you all, both in the society and away from it, a very happy and successful year.

MR. J. H. BADCOCK, in proposing the thanks of the Society to the President for his address, said it was eminently instructive and a well-timed plea for the scientific basis of the Society's work.

DR. SIM WALLACE seconded the motion, which was carried by acclamation.

The PRESIDENT briefly replied.



MR. A. C. LOCKETT then read his paper entitled

### THE RESULTS OF EXTRACTION.

THE writer proposes to deal with this subject more from the standpoint of Orthodontia than from that of other branches of dentistry, yet it is not possible to keep them separate.

The loss of teeth by extraction is the penalty people must pay for their lack of care and negligence in periodical visits to their dentists, with the view of preserving them intact until an old age, when they may be lost through the agency of certain pathological conditions, which at the present time our profession may not be sufficiently skilled to master, or to conditions over which they may not have control.

The forceps play a very useful role in practice where their use is essentially indicated, and proves a blessing to parts that are infected with roots or teeth that the operator cannot make healthy. The result of extraction on the relationship of the dentures in middle or later life is perhaps not so disastrous as it is, and will be, on dentures of individuals in youth, or verging on manhood and womanhood, and these facts ought not to be lost sight of in a careful study of the conditions before one decides to remove a tooth from the denture of a patient at this particular time of life.

If teeth must be removed at this period, or at any period of life, their places ought to be filled at once with substitutes on plates, so that the remaining teeth may remain in their present positions and be supported until such time as normal absorption on the soft tissues has taken place, when a more permanent substitute ought to take its place. This line of argument applies only to cases other than wholesale extraction, and especially to cases where there is a respectable relationship of the teeth of both jaws and in which none of the teeth have yet been lost.

Looking at the subject then from an Orthodontia standpoint, we will see how disastrous a result can be produced in many cases on dentures where thoughtless extraction took place and quite possibly some results that may commend themselves to us, yet one can't but be impressed with the fact that some of these commendable cases might have been better results if extraction had not occurred.

It is, I think, safe to assume that we have in our profession to-day three distinct schools of thought on the treatment of Orthodontia cases. I am open to correction, but I am taking this stand as a result of a careful observation and study of the situation. These three schools of thought may be put in the following order:—

1. The extractionist, who treats his cases with the forceps alone, regardless of any mutual relationship of the teeth.

2. The middleman, who treats first by extraction and then with appliances, to get results that may be considered good enough, and possibly from his standpoint perfect.

3. The man who treats his cases with normal occlusion of the teeth as the basis of his operations, with a view of getting a natural and perfect result of the denture, and to give the best possibilities of development of the jaws and face.

I suppose it may be possible to find cases in which one or more teeth are standing outside the arch, the extraction of which will leave the denture in no worse condition than it was before extraction, but, generally speaking, the extraction is not likely to have proved of any particular benefit to the denture.

Treatment of this kind is hardly worthy of our profession, and ought not to be countenanced by us in the higher grades of our practices where it is possible to do otherwise. Unfortunately for us as a nation, there are hundreds of cases to whom no other course of treatment is open, because the individuals cannot afford to give the time and fees necessary for work of a higher grade, and I can't help but think that in the first class there are many practitioners who treat with the forceps against their own honest convictions. To treat this subject fairly, I feel that this sad condition ought to have our charitable criticism.

There is, however, a decided element of danger in a charitable criticism, for this sort of treatment is very apt to creep into practices where it ought not to do, and on this aspect of the situation I don't think we ought to be too caustic. Given anything like a possibility and a fair opportunity of treating a case, it is our duty to our patients and our profession to treat them on higher lines than the one adopted by the extractionist. Having given him the consideration due to him on the ground of his misfortune in having to work for people that cannot afford to be correctly treated, we will now pass on to the more fortunate practitioner, who has more favourable opportunities of doing a higher standard of work.

The difficulties of treating such cases in some cities are such that it is well nigh impossible to lay down a hard and fast rule for treatment, but I am inclined to think that there is a great deal more extraction and treatment practised than is really necessary, and that many of our cases might be treated without extraction if we really valued and respected the denture as a whole more than we do.

A good deal may be said of the middleman, not so much on the score of his methods being correct, but on the ground of his perhaps being unable to adopt any other course, for reasons too numerous to mention in this paper, yet a great deal may be said against him, for treatment is practised by this class of our profession that is by no means a credit to us as a profession. The cause for this will be found, not in the fact that extraction has been resorted to, but that it has been carried out without any due regard to the effect on the denture and on the esthetic aspect of our work, two most important factors to be considered. It matters little what a student may have learnt at his Hospital, if he has not studied carefully, and does not know what the results of extraction will be on the denture and on the esthetic side of our work, he is a dangerous individual to be allowed to practise dentistry in a respectable and high-class practice, as far as the ultimate results of extraction on the denture as a whole are concerned.

Extraction will be necessary in general practices for many years to come, until the standard of public opinion becomes higher,



and people value and respect their teeth more than they do, and will have them attended to before they become hopeless wrecks. We are well equipped with practitioners who can meet this need to perfection, and it now remains with us to equip ourselves in like manner to meet the needs of the United Kingdom in Orthodontia.

With this preliminary introduction to the results of extraction, let us now consider them under the following headings :—

1. On our international professional standing and local public opinion.

2. The development of the jaws and eruption of the permanent teeth.

3. On dentures with normal occlusion of the molars, the lower molars in relation to the uppers.

4. On dentures of distal occlusion of the molars.

5. On dentures of mesial occlusion of the molars.

1. *Our international professional standing and local public opinion.*

There is nothing to be gained by an elaboration of details under this heading, for our time can be more profitably spent in considering other more important and profitable portions of this paper, yet one can't but be impressed with the fact that our professional status is largely determined by the too liberal use or unintelligent use of the forceps.

The successful treatment of a difficult case of an irregularity without extraction must surely appeal to the minds of those interested in this work, and although there are cases of failures on record of cases that have been treated on these lines, it does not necessarily prove that the treatment was incorrect, but very possibly that the retention was deficient. We can do more to build up our standard by work on these lines than on any other, and by so doing we naturally carry public opinion with us in the same direction.

2. *The development of the jaws and eruption of the permanent teeth.*

We find here very frequently conditions demanding use of the forceps. The processes of absorption and eruption are variable and inconsistent, and one or more of the causes of the inconsistency of these forces are commonly present, and give us persistent temporary teeth. The molars and canines are the chief offenders, and the removal or retention of these teeth calls for the exercise of thought, reason, and a careful study of the history of the case in question. If there is evidence of a successor, the persistent offender should be removed ; if there is no evidence it ought to be allowed to remain until the full normal vertical growth of the jaws has taken place, and at that time one's own judgment as to the wisest course to adopt must then be brought into play. The extraction of some of these persistent temporary teeth often leads to surprising results as an aid to development and speedy eruption of the permanent successors, which for some reason were retarded. Here is one condition where the forceps proves a great blessing in Orthodontia. Loss of space in the molar region of the deciduous teeth

is usually followed by an irregularity of the premolars of the permanent set, or a crowding out of the canines.

I have a slide here which will demonstrate this condition beautifully. Slide 1 will show the occlusal surfaces of an upper and lower model of Class 1, Angle's Classification, *i.e.*, with the first permanent molars in normal occlusion.

The temporary molars, as you will see, in the upper jaw were not extracted, and the bicuspid has ample room for eruption. The canines can just find room, and there is a slight irregularity of the incisors. On the lower jaw we have a very different state of affairs. Both temporary molars were extracted at different sittings, and what have we got? On the left side, the first permanent molar is practically in contact with the first bicuspid. On the right side, there is only half as much room as is necessary to accommodate the unerupted second bicuspid, and if the eruption is delayed still further the space on that side will become less.

Nor is this all, for if we look at the models in normal occlusion in the next slide (slide 2) there is every evidence of a great effort on the part of the upper teeth to accommodate themselves to the teeth of the lower jaw. The position of the laterals might suggest a mouth breather, but the boy's history is a good one, and he has never been a mouth breather, and has never had adenoids. The loss of space in the temporary molar region is accounted for, not by the moving forward of the molars, but by the lack of development of the alveolus as a result of the absence of the temporary molars to provide the supporting force that is necessary to keep the lower incisors at their correct distances from the permanent molars and enable the bicuspid to take their correct places in the arch. I do not believe that the lower molars moved forward in the lower arch in this case, for the molars are in normal occlusion, and the upper first molar has had every opportunity of taking its correct place in the arch. This condition is due to the effect of muscular pressure of the lips and cheek being greater than the muscular force of the tongue.

The extraction of these temporary molars has, I firmly believe, resulted in:—

- (1). Loss of space for the lower second bicuspid.
- (2). Lack of development of the alveolus to keep the lower incisors at their correct distances from the first permanent molars.
- (3). Probably an irregularity of the upper incisors due to muscular action forcing them to accommodate themselves to the lower teeth.

Another series of slides will show a somewhat similar condition.

Slide 3 will show two lower models of the same jaw taken at different sittings.

In No. I. you will see that the lower right first temporary molar was prematurely extracted. The impression was not taken immediately, but some little time afterwards.

In No. II. you will notice that the space is growing smaller, the measurements from the centre of the six year molar to the centre of the temporary canine being in the first model greater than in the second model.



I will show in another slide that this space is lost by backward movement of the temporary canine, and not by forward movement of the second temporary molar, which it is often supposed to do.

Before we leave this slide, just compare the dimensions of the spaces in the two models. The first temporary molar on the left side has been lost in the natural process of absorption, and you will see there is plenty of room for its successor, which took its normal place in the arch later.

The next slide (4) will show impressions of the same case at later periods. No. I. shows the arrival of the first lower right bicuspid erupting buccally.

No. II. shows the same case after treatment where this space was made by means of appliances, and a good result was gained. It is safe to assume that this case would not have needed treatment if premature extraction had not taken place.

The next slide (5) will show the first two lower models of this case in their relations to the upper. Please note the exact relations of the upper and lower canines in the model on the left side of the picture. If you compare the two pictures, you will see that the canine in the model on the right side of the picture, has moved distally quite one-half its width, and this has been brought about through the absence of the supporting force of the missing tooth to keep the anterior teeth at their normal distance from the six year molar, a fact which rather goes to uphold the theory to account for an irregularity of the upper anterior teeth in the first model shown, slide No. 1. Slide No. 6 will show the other lower models in occlusion.

These last two cases were cases of normal occlusion of the molars. Now let us look at one with distal occlusion of the molars, slide No. 7.

We have here a case in which all the eight temporary molars were extracted, and a child of wealthy parents at that. The next slide (8) shows the same case six months later, the conditions growing more complicated. Both upper and lower jaws are contracting, due to muscular pressure. The first upper molar has moved or tilted forward, a condition that seems to occur more readily in cases of distal occlusion of the molars than in normal occlusion. This is only a theory and needs more proof.

The next slide (No. 9) will show the case in process of treatment. A comparison of the original model with this model from which the slide was taken, will reveal a lack of growth and development of both jaws and alveolus, amounting to sufficient contraction to make it necessary to lengthen the space to accommodate the bicuspids, which is contrary to the condition that would have existed if extraction of the eight temporary molars had not taken place.

These three cases prove conclusively that the presence of the temporary set intact in every respect is necessary for normal development of the jaws and the final normal eruption of the permanent set, that the supporting influence of the teeth in bringing about this does exist.

These are cases we can be proud of, for it shows clearly what is possible in orthodontia, as we understand the term, embracing as it does not only the treatment, but the prevention of irregularities. I can afford to speak highly of the last two cases, and the pains and care shown in obtaining records each year and treating them, for they are the property and work of Mr. Northcroft, and I am sure he deserves our congratulations, and I am indebted to him for the loan of the models, from which the slides were made.

Now let us see what changes take place in the vertical development and growth of the jaws and teeth between the upper and lower lip folds. This will be seen in the next slide (No. 10) and I will ask you to follow me very closely, as this slide is only preliminary to the next slide (No. 11).

This slide shows impressions of the same mouth taken at the ages of three, five and a half, and at thirteen. We can assume that normal development was taking place, as the model in the centre of the picture shows all the characteristic spacings that we would expect to find at this age. Notice also in the same model the edge to edge bite of the molars, almost verging on distal occlusion, in spite of which fact we have a perfect permanent set on the lowest model.

Is it likely that if at the age of five and a half years all those teeth were extracted, or if the molars were weeded out, we would have had a result of perfection such as we have. I don't think so.

One constantly comes across cases in which the permanent teeth, and especially the bicuspid, do not erupt normally above the gum line, and the waiting game seems to do very little for this condition. It becomes necessary to elevate them by mechanical means, a method which I am not sure is always satisfactory and permanent.

This condition on the surface appears to be one of lack of vertical growth of the jaws and alveolus to enable the teeth to stand at their normal heights and establish the normal curves of the denture characteristic of the type and temperament; or it might appear to be a condition of a halting or stopping of the process of eruption, and in some cases to such an extent that contact between the upper and lower bicuspid is never established.

Mouth breathing, abnormal nasal function and respiratory complications, inefficient mastication, may account for this in part, but one can't help but think and suspect that premature extraction of temporary molars, or a septic condition of any of the temporary teeth may be responsible to a large extent for an abnormal process of eruption and of the lack of vertical growth of the alveolus.

In this slide (No. 10) which we have before us, we have conditions of normal eruption and vertical growth giving us a perfect permanent set.

In slide No. 11 we have two cases of missing second bicuspid, with accompanying lack of vertical growth, as a result of the persistent second temporary molar. This slide proves nothing in particular, but it shows clearly that the permanent teeth erupt



to a greater level at their summits than the temporary ones do, and that the vertical growth of alveolus follows the teeth.

It also shows that the presence of normally erupting bicuspid is necessary to give normal vertical growth in that area, and I can see no reason or objection for an assumption that the normal retention of temporary molars, up to the period of extrusion, is necessary for growth and occlusion vertically on the same lines as they are necessary in a mesio-distal direction.

There are many lessons we might learn from the cases shown up to this point of the paper, and some of them may be enumerated as follows :—

(1). That periodical examination and treatment of children's teeth is of vital importance, not so much from the standpoint of repairing damage as preventing decay.

(2). That the presence of the temporary set as a whole or in part, in a healthy condition, induces normal growth and development, where other abnormal forces are not present, and keeps permanent teeth that have erupted in their normal positions until other permanent teeth erupt at their respective periods.

(3). That a truly functional mouth is more likely to be produced by keeping the child's teeth in good order than by extracting them wholesale or in part.

(3). *Results of extraction on dentures of normal occlusion of the molars.*

We have such abundant proof that treatment of this class of cases at a favourable age and under anything like reasonable conditions, without extraction, is followed by good lasting permanent results that one may definitely say that extraction in this class is always incorrect treatment. In spite of this, however, there are many cases on record of extraction of laterals and first molars to treat cases of irregularities, not only of the past, but in the present day.

This is one condition for which there can be no possible excuse. The esthetic factor is one of vital importance to us, there is every evidence of its being considered in our practices in the manufacture of dentures and crowns to improve appearances, and why should the same principle not hold good in the treatment of our cases? What right has anyone to deliberately extract one or two sound laterals, which, together with the centrals, give that pleasing and artistic finish to a sweet smile? One can conceive of no other reason to prompt anyone to so treat a patient, but that of appalling lack of respect and regard for the thing he is supposed to have in his charge, and an insatiable thirst for blood.

Slides Nos. 12 and 13 will show typical cases of what may be described as the characteristic canine smile, a sort of smile that gives one the creeps when it meets you. A comparison of the two models on each slide ought to require no comment on our part; it shows the conditions before and after treatment.

Now let us see what the extraction of a six year molar in this or any other class will do for the denture. To discuss it from the standpoint of treatment would not be wise, the language might not be Parliamentary.

Slide No. 14 will show a typical case. The four six year molars were extracted at the age of fifteen, they were all sound. The patient told me they were extracted to treat an irregularity, and I can't diagnose that such a condition ever existed before extraction, yet there is evidence of it as we see it now. A careful study of this slide will reveal the following certainties and possibilities in the future history of this case :—

- (1). Complete ruin of a perfect masticating surface.
- (2). All the upper and lower bicuspid and molars on the move in search of support.
- (3). A marked tilting of the lower second molar.
- (4). A straightening out of the normal curve of the masticating surface of the upper teeth.
- (5). A spacing of the teeth, in which fibrous food becomes wedged, resulting in a recession of the gum, and exposure of the peridental membrane and cementum, setting up an irritation of gum, membrane and cementum, producing a focus of inflammation that will sooner or later mean a pyorrhœa pocket. All these conditions will in many cases be increased by the violent use of the tooth pick.
- (6). An elongation of all teeth that have lost the support of their antagonists, exposing the cementum and peridental membrane. An increase of the normal overbite in incisor region, in this case the cutting edge of the upper incisors is impinging on the labial gingivæ of lower incisors.
- (7). Overwork of the anterior teeth with a very probable possibility of pyorrhœa in later years and a certainty of spaced upper incisors.

Most of these conditions in this particular case of molars in normal occlusion, might have been prevented if the extraction of the four six year molars had taken place just before, or at the erupting period of the second molar, yet it would not improve the formation and shape of the mouth. Extraction of the lower first molar at any other time is always followed by marked tilting of the second molar, while the tilting is not usually so great in the upper jaw.

Slide No. 15 will show the same case in occlusion on the other side.

Slide No. 16 will show another similar case of extraction of first molars with better results than in the former case, yet there is no knowing what may happen in years to come, as very few of the teeth have any support.

The next slide, No. 17, will show a case of protruding upper incisors with molars in normal occlusion mesiadistally. The upper first bicuspid was extracted and the case treated. You will see how the upper bicuspid and molars have come forward in a vertical position and converted a case of normal occlusion to that of spurious distal occlusion of the bicuspid and molars, and in addition to that, we still have a space where the extraction took place—a grave in memory of departed friends.

The next slide, No. 18, will show two cases of extraction of lower bicuspid in what apparently were cases of normal occlusion.

In No. I the lower second left bicuspid was extracted, and in





FIG. 1.



FIG. 2.

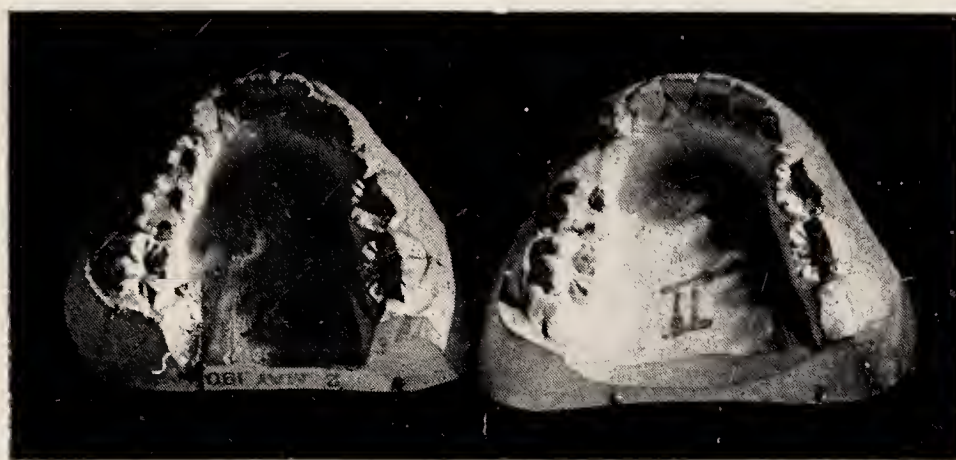


FIG. 3.

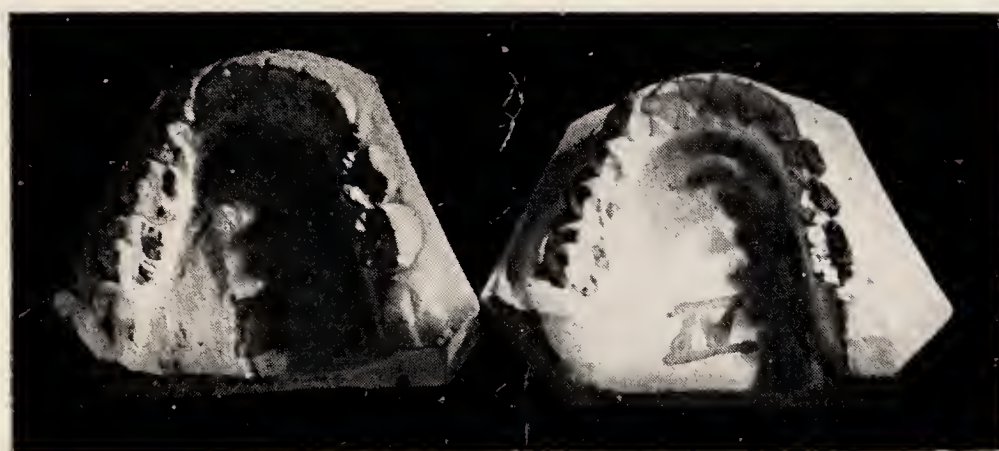


FIG. 4.

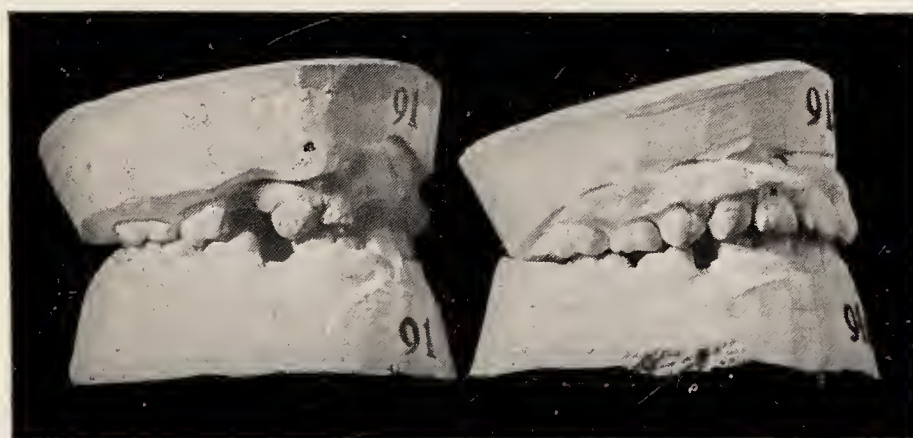


FIG. 5.

TO ILLUSTRATE MR. LOCKETT'S PAPER.





FIG. 6.



FIG. 7.



FIG. 8.



FIG. 9.

TO ILLUSTRATE MR. LOCKETT'S PAPER.



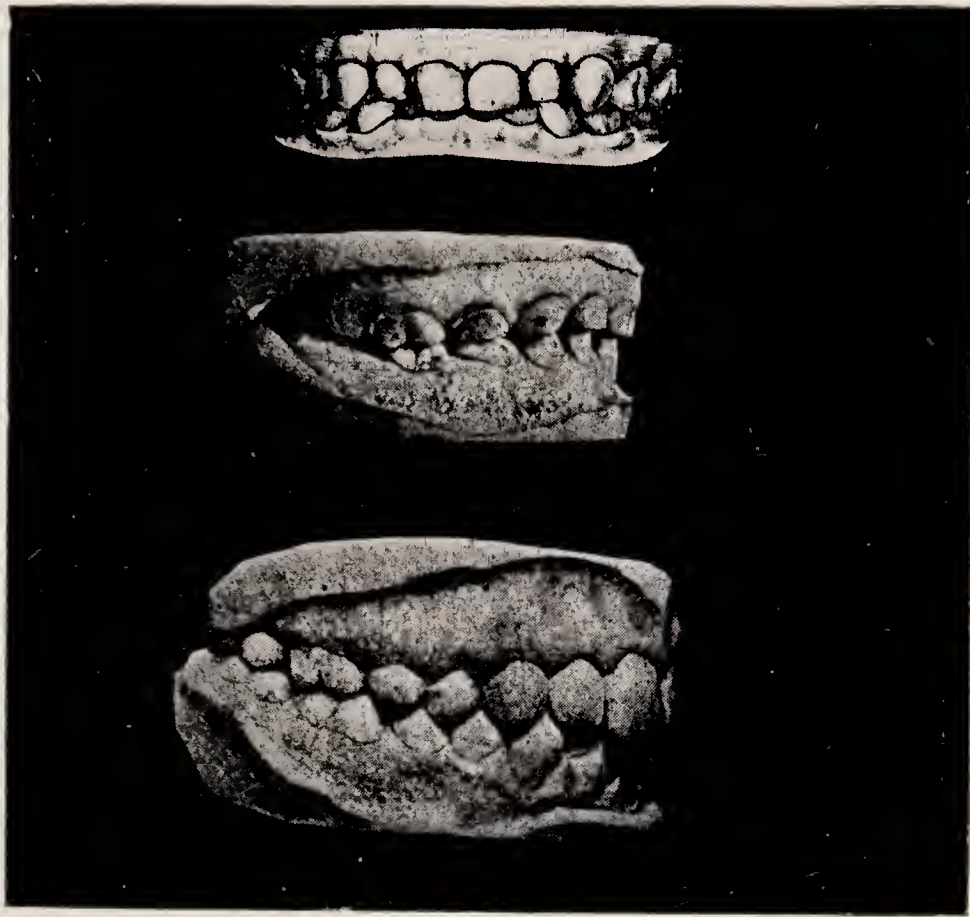


FIG. 10.

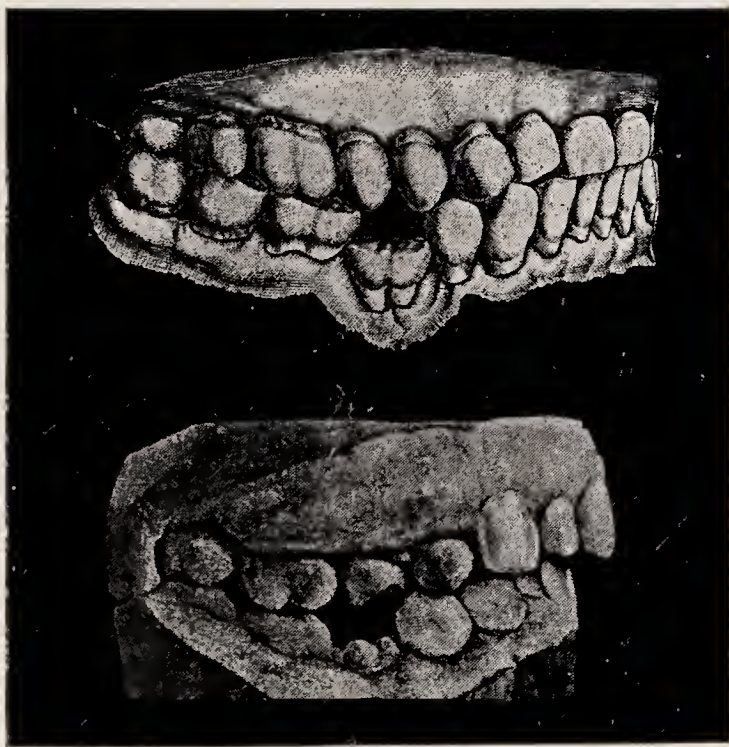


FIG. 11.



FIG. 12.

TO ILLUSTRATE MR. LOCKETT'S PAPER.





FIG. 13.



FIG. 14.



FIG. 15.



FIG. 16.

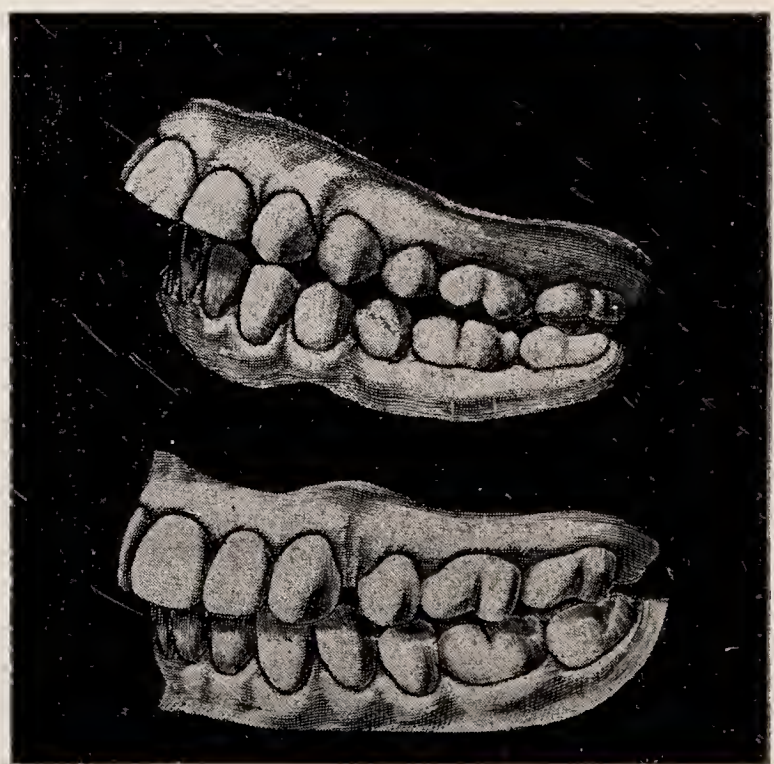


FIG. 17.

TO ILLUSTRATE MR. LOCKETT'S PAPER.



No. II the lower second right bicuspid with results in later years similar in both cases.

(4). *Results on denture of distal occlusion.*

Treatment of superior protrusion, or Division 1, Class 2 cases, by means of extraction of the first upper bicuspid, followed by treatment with or without appliances, often brings about results that are not so heartrending.

The next slide, No. 19, will show three models, all members of one family. In the first case, nothing was done; the second case was treated by the extraction of the upper first bicuspid; the third by extraction of upper first bicuspid and a lower incisor. We have no record of the conditions before treatment and at what age they were treated. The fact remains that if there was marked superior protrusion, the results are of such a character as to commend themselves to our consideration, even though they are not perfect.

A comparison of this slide with the next one will reveal a most marked contrast. In the last slide (No. 19), we conclude that an intelligent extraction occurred, and we give the operator the benefit of the doubt and congratulate him. In this slide (No. 20), the operators were a bit off their mark. This case has been treated three times by three different operators, with results such as you will see.

Operator No. 1 extracted the lower left first bicuspid; No. 2 extracted the upper left first bicuspid; No. 3 extracted the lower left first molar, at the age of twelve, and you will see how nicely the lower second molar has come apparently forward in an upright position.

Here is a beautiful example to show how absurd it is to extract to make room. Compare the development of the left halves of the upper and lower jaws in this case with the right side of both upper and lower jaws, and you will see that in the upper jaw we have almost a straight line from molar to central, with a very deficient area of the hard palate on the left side as compared with the right side.

Slide No. 21 will show the models in occlusion after treatment.

Slide No. 22 will show a case of superior protrusion treated by extraction of first upper bicuspid. By a comparison of the vertical lines, the space made by extraction was nearly filled by the moving forward of the second bicuspid and first molar and a distal movement of the canine brought about by appliances.

Slide No. 23 will show another similar case treated without extraction, and I leave it to my hearers and readers to decide as to his choice of treatment in the future. Treated at the age of twelve by Dr. Boque, of New York, who states that the condition seven years after treatment remains in every detail as we see it on the lower model on the slide.

*Result of extraction on Class II, Division II cases.*

This happens to be a class where the extraction of bicuspid, if intelligently carried out, produces a result that may be considered fair, yet not perfect.

Slide No. 24 will show two cases of this class treated on different lines. In the model on the left side of the picture the four first bicuspidis were extracted, and that on the right was treated without extraction, and you can judge for yourselves on the finished result, apart from the comparison of the occlusion of the teeth and the dimensions of the arches; please note the difference in the normal and abnormal overbite of the two finished cases.

(5). *Results of extraction on cases with molars in mesial occlusion.*

I am sorry I have no slides to show results of this class. This is a very difficult condition to treat, except at an early age, when it is possible to treat successfully without extraction. This brings us to the end of our list of headings under which we have considered our subject.

I have tried to treat the subject fairly from all points of view, and if there happens to be any element of prejudice in this paper, it certainly is in the right direction and for our mutual good and progress.

I hope we may look forward with pride to the day when in the treatment of our cases the forceps will play little or no part therein, and that we can rise to the occasion and fill a part in our national and professional career, that cries out on all sides for aid and skill of the highest order. Let us see to it one and all, that the dentures and faces of our boys and girls are not ruined and mutilated by that weapon of blood—useful in its proper place, but a curse in any other.

It is on these lines, and on these only, that we can ever expect to hold an international professional status that is worthy of us and that will make us an object of respect and esteem.

I am indebted to you all for your patient attention, and I trust also for a profitable discussion. I sincerely trust that this paper may be of some value to our society, and especially to those outside of it, and I am sorry it has fallen to my lot to write on what may be considered treacherous ground, but I am so much interested in this subject that I am prepared to take all the risks that come with it, affording one as it does a sense of combat, defeat and possible victory, the spice of all true life.

#### DISCUSSION ON MR. LOCKETT'S PAPER.

The PRESIDENT said the paper was an interesting one on a debatable subject. He thought, as he had said in his address, that the question of extraction ought to be settled on definite lines, and in order to do that it was necessary to start at the beginning and obtain a workable classification. Having done that, it was possible to say under what conditions it was legitimate to perform the operation of extraction and in what case it was not legitimate. He was looking forward with great keenness to the time when it would be possible to say in such and such a case, under favourable conditions, extraction should not be done, and in another case, under the same conditions, extraction should be performed. He hoped that the paper would assist the profession in arriving at some definite pronouncement on the subject.



MR. J. H. BADCOCK said the models which he had lent Mr. Lockett were taken from three sisters who were all the subject of distal occlusion. The one on the left was untreated and the one on the right was treated by the extraction of the two upper first bicuspid and a lower incisor.

MR. A. C. LOCKETT said the second one was treated without the extraction of the lower incisor and the third was treated by extracting the bicuspid and lower incisor.

MR. J. H. BADCOCK said that in one case the two upper bicuspid and the lower incisor were extracted many years ago by Mr. Boyd Wallis. In the other case the extraction was done in Spain by a gentleman who extracted the two upper first bicuspid only. The case where two bicuspid only were removed was by far the best of the three ; in fact, it was so nearly a perfect case that if he could ensure getting such a result by the extraction of the two first bicuspid always he should never think of doing anything else. Although the arches were not absolutely normal he thought the most critical eye would not detect it unless the teeth were counted. The face was the face of a good looking woman and the jaws did not appear to be too small for the other features ; also the case in which the bicuspid only were extracted was distinctly better than the case where the lower incisor was extracted also. Those cases were particularly instructive, because they were the models of cases that had been completed for many years and showed permanent results.

He desired to thank Mr. Lockett very heartily for his valuable paper. A great many points had been raised of extreme interest, and if Mr. Lockett had been somewhat flogging a dead horse in the matter of extraction of first molars, thanks were due to him for drawing attention to the evils of extraction in other respects. Nowadays there were not many who would think of extracting first molars for the purpose of regulation, except in those cases where the first molars were unsavable by reason of caries, and then it might be done, because it was not possible to do anything better. There was one expression in the paper where the author spoke of the "wedging action" of the temporary teeth. "Wedging action" implied force, implied that the temporary molars had some forcible action on the incisors, that the incisors were in some way thrust forward by means, perhaps, of pressure transmitted through the temporary molars from behind. If that was Mr. Lockett's meaning, he had to join issue with him. It did not seem to him conceivable that the position of the incisor teeth was obtained by pushing forward from the back, although he knew the view was held by some people. It seemed to him the results shown could equally well have arisen by the falling back of the incisor teeth, owing to the removal of the temporary molars having given space for them to fall into. Mr. Lockett had shown some horrible examples of the results of extraction, and he thought in his anxiety to drive home his point he had chosen some of the worst and had taken, not the results of extractions that had been thought out and undertaken by men who

knew what they were about, but haphazard extractions, undertaken with no motive or understanding of the case. He himself was not speaking as an advocate of extractions, though in some cases he felt it was impossible to do without them. He thought that if cases were taken only from the practice of those who really made a study of the thing and extracted with care, perhaps a different result might have been shown. In the past he had done a good many extractions himself, and when he turned back to his old models of years ago, he turned away from them again with a shudder and a feeling that perhaps he ought not to be still practising dentistry ; yet he was not aware that among those examples there was anything quite so bad as had been shown that night.

DR. SIM WALLACE said Mr. Lockett had marshalled his facts so well that he had left very little for criticism. The advisability of extraction seemed to him, however, to depend on two factors, one it was possible to gauge and the other it often was impossible to foretell. The first was whether the jaw had developed normally in the past. If there was insufficient development of the jaw, it would be shown by the crowding of the temporary teeth. It was extremely difficult, however, to say what would happen in the future, and he thought many of the excellent results seen after extraction or without extraction largely depended on the normal growth of the jaw and had nothing to do with operative interference. Sometimes the growth of the jaw was not normal ; there was a continuation of the factors that had brought about the contracted jaw in the first instance, and if extractions had not been made, the results were often even worse than when extractions had been performed. He was convinced that the normal development of the jaw did not depend on the presence of erupted teeth. In the normal arrangement of the temporary teeth, there were always spaces and consequently there could be no such thing as wedging producing the growth of the jaw. Spaces normally developed between every tooth in the temporary set of the upper jaw, so that it was difficult to see how wedging could have anything to do with it, and the extraction of a temporary tooth under such conditions would only increase the size of the spaces. In the lower jaw the temporary molars touched, but the cases that had been shown, as Mr. Badcock said, could be equally explained by the tilting backwards of the incisor and canine teeth. That the canine tooth did not necessarily fall back only when the temporary molars were extracted was proved by the fact that there was a space into which they could fall back in the normal dentition. He could not agree that the wedging of teeth was necessary for the development of the jaw ; he was very much inclined to think that under normal developmental conditions the jaw grew large enough to prevent wedging or crowding and the jaw was carried forward by the pressure of the tongue.

The PRESIDENT said it had fallen to his lot twice during the last week to be extremely pleased with the results of judicious removal of the temporary teeth at the right time. Although Dr. Sim Wallace believed that the temporary teeth were retained



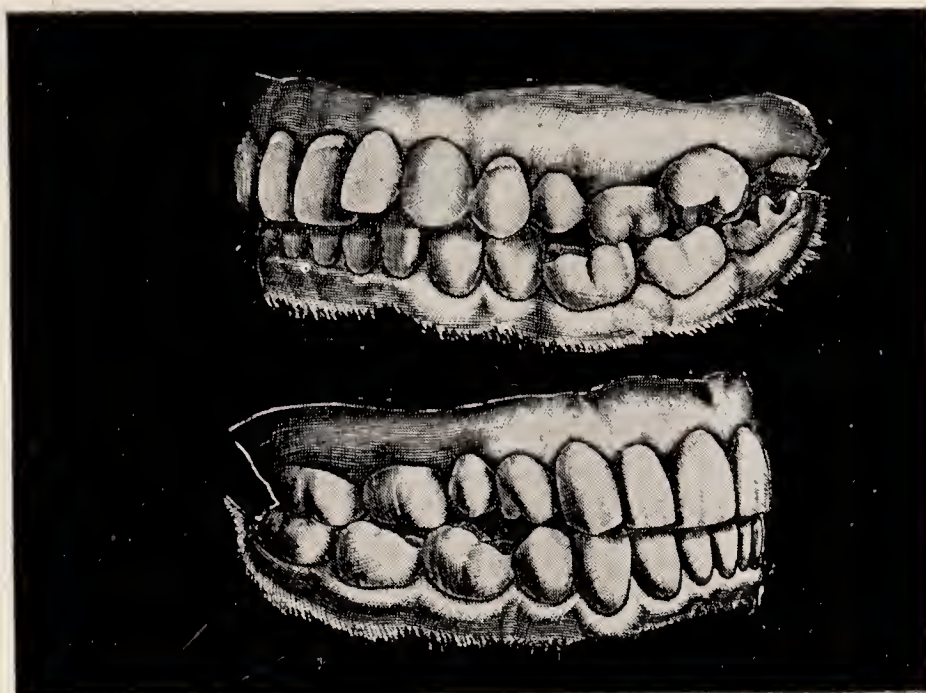


FIG. 18.



FIG. 19.

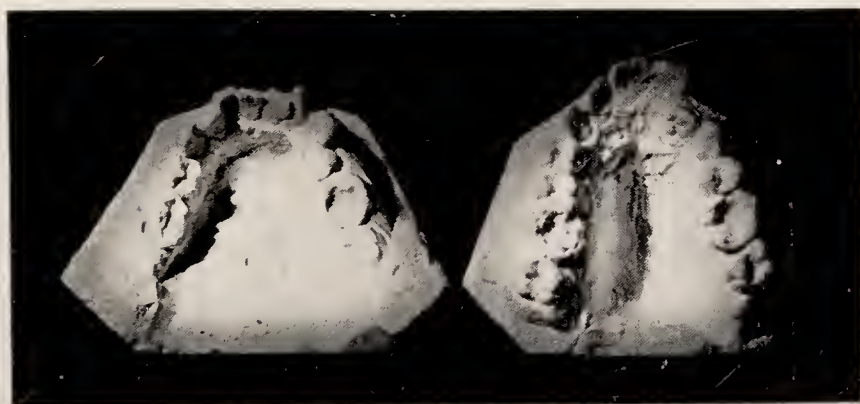


FIG. 20.



FIG. 21.





FIG. 22.



FIG. 23.

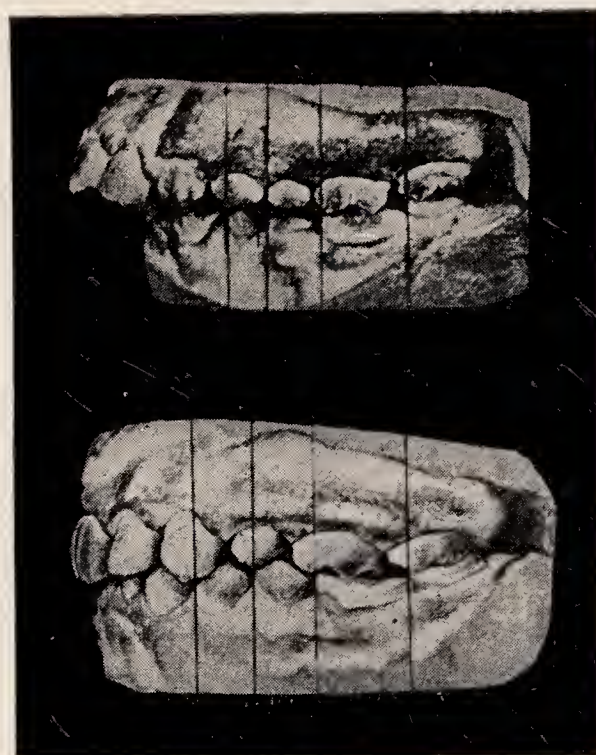


FIG. 24.

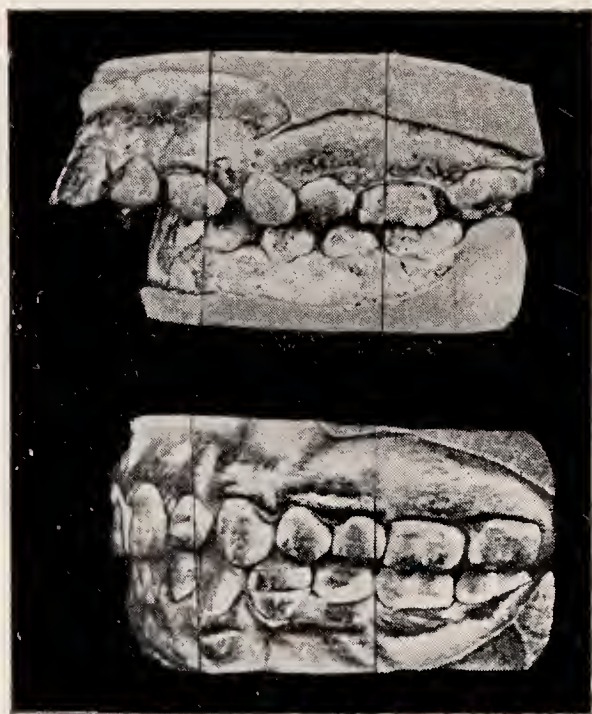


FIG. 25.

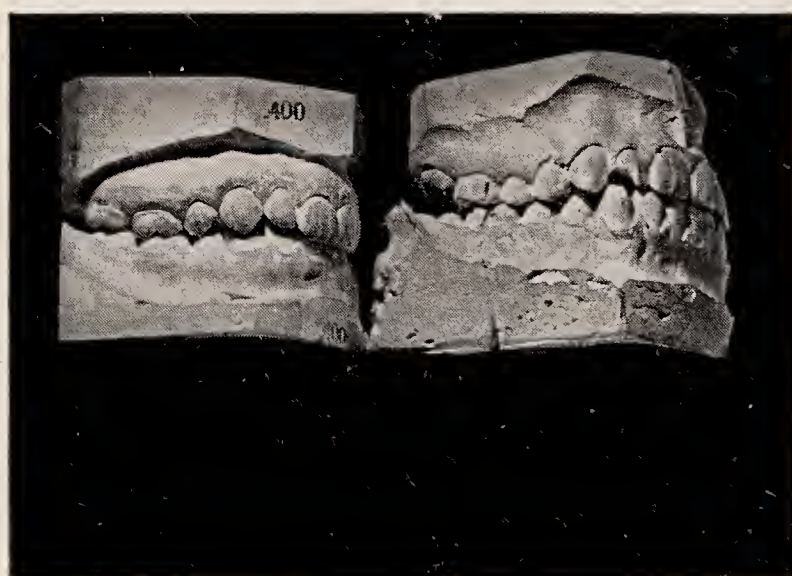


FIG. 26.

TO ILLUSTRATE MR. LOCKETT'S PAPER.



in normally developed jaws very much longer than generally supposed, it was extraordinary what very good results might be obtained by the judicious removal of the temporary teeth at the right time. If the absorption force was feeble, extraction seemed to aid nature considerably, and cause the eruption of the first premolars at the right time. Only that day he had seen a patient who four years ago had an extraordinary condition in which the temporary teeth of the lower jaw bit right outside the uppers. By the removal of the temporary canine at the age of eight, the bite was altered, and the jaw enabled to swing round, and now the patient had a perfect set of teeth. Nothing else was done in the way of correction except to look after the other temporary teeth. It was a very satisfactory thing to see, that, by watching the cases when they were young, and studying occlusion from the beginning, the patient could be helped to avoid all the subsequent trouble of wearing apparatus or the possibility of having permanent teeth extracted.

MR. HENRY VISICK asked Mr. Lockett what he would advise in cases where the temporary molars instead of wedging, became wedged. Sometimes a second temporary molar became wedged between the first bicuspid and the six year old molar, the latter appearing to be pushing forwards over the top of the temporary molar and depressing it in its socket. He had now the case of a girl, in which all the teeth had erupted except the left lower second bicuspid, and in that case the temporary molar was retained and was perfectly firm; he was wondering whether it ought to be extracted. In such cases the eruptive force did not seem to be great enough to push the temporary molar out of position.

MR. CHAPMAN referred to the last slide shown upon the screen. In the middle the first bicuspids had been removed, and there was excessive over-bite; in the other cases normal occlusion had been obtained. From the way in which Mr. Lockett had expressed himself, he took him to mean that the over-bite was due to the extraction of the bicuspid, and he should like to know whether that was his intention. It was rather an important point whether both cases had the same amount of over-bite before any treatment was adopted.

MR. C. S. MORRIS recalled a case Mr. Lockett had brought forward at a recent meeting, a patient with what were described as "exceedingly ferocious habits." In that case he gathered that Mr. Lockett pushed the whole of the upper teeth backwards, and by that means obtained a very good result. He had always been intending to ask Mr. Lockett what he gained over extracting the first bicuspids on each side and driving the teeth back. It seemed almost impossible for the upper wisdoms to erupt under the circumstances, and appeared to be striving after an ideal without any very great practical advantage. In difficult cases he did not see why the first upper bicuspid should not be extracted if the sixes were driven back immediately. The case of the over-bite seemed a very easy matter to correct by wearing a plate in order to allow the back teeth to rise, so that there was plenty of room

to drive the sixes in and get a normal amount of over-bite. He did not advocate always extracting, but in a great many cases practitioners seemed to go an enormous way round to get a very doubtful advantage over the extraction of the upper bicuspid. With regard to the lower temporary molar being lost he did not think there was the slightest doubt about its danger to the normal occlusion. He had a case of a boy who came from South Africa where the dentist thought it a very bad thing to keep the lower or upper sixes at all and let them all go, with the result that the boy had lost most of his temporary molars and had enormous cavities in the first temporary molars. At present he had the lower incisors only, and no temporary molars at all, and if it had not been for his patching up the permanent molars the boy would have had nothing but his lower incisors. The boy had nothing between the first molars and the lower four incisors, and he thought something should be done to keep that space and give the boy something to eat with. He did not think any ordinary person would allow things to go to that extent.

MR. W. RUSHTON thanked Mr. Lockett very much for his paper, although he profoundly disagreed with him on many points. He himself was a great believer in what he called surgical short-cuts. For instance, many children were brought suffering from adenoids, and when the parents were asked whether the child had been operated upon they would say they had taken him to so and so, who had provided him with breathing exercises; and for years they went through those exercises, which might ultimately cure the child, when they might have done the thing by a surgical short-cut. Some of the most satisfactory regulation cases he could look back upon were those in which he had taken a short cut, in which no regulation appliances had been worn, and where the articulation was to all intents and purposes perfectly good and sound. It was necessary to exercise judgment. It was especially to be considered in those cases in which the jaw could not be expanded to the proper size. What was the use of trying to bring thirty-two teeth into a narrow jaw when it was perfectly well known that the jaw, however much expanded, would never hold those teeth in proper vertical relationship with their opponents? In such cases it was the wisest and best thing, both for the practitioner and the patient to adapt the number of the teeth to the capacity of the jaw. Mr. Hedley Visick, at a previous meeting, had shown a case which was an object lesson in the extraction of bicuspid. It appeared to be as perfect a case as one would wish to see. Mr. Lockett condemned the extraction of temporary teeth, and personally he was very much inclined to agree with him. He was one of those who agreed, if possible, in preserving the temporary teeth even to the extent of root treatment. A great deal had been heard of the wholesale extraction of temporary teeth in septic mouths lately, and he should like to know whether any cases had been followed up to see whether the permanent dentition had been profoundly modified by that form of treatment.

MR. J. H. BADCOCK, in answer to Mr. Rushton, said he had the



pleasure of being at the *Conversazione* of the Royal Dental Hospital, when several of the cases that had been treated by wholesale extraction of the temporary teeth were shown, and he asked Mr. Colyer, who was present, what was the result on the permanent dentition, and he said that usually it resulted in the necessity for the extraction of four bicuspid.

THE PRESIDENT, in reply to Mr. Morris, said it had been his custom, where it had been necessary to remove temporary teeth prematurely, to provide children with artificial teeth in the form of vulcanite biting plates, and so restore lost function. He was a firm believer in this treatment and advocated it most heartily; the jaws went on developing in the most astonishing manner without the slightest crowding of the incisors.

MR. MORRIS said he had thought of doing it in that way in the case he mentioned.

MR. THOMSON said it also hurried on the eruption of the bicuspid.

MR. A. C. LOCKETT, in reply, said that with regard to the charge of flogging a dead horse he had to apologise for having mentioned the matter, but, as he had said in the paper, one of the motives in writing on the subject was not only to reach the members of the Society, but, inasmuch as the Transactions of the Society were published in journals that went to all parts of the United Kingdom and many parts of the world, he felt he was in duty bound to bring details of the particular subject of extraction forward. Both Mr. Badcock and Dr. Sim Wallace had referred to the wedging action of the temporary molars, and perhaps he was not wise in using that term, because the impression he had in mind was not that the temporary molars had any wedging effect in driving the incisors forward, but that they acted as a wedge in keeping incisors and canines at their normal distances from the six year molars. He used those words two or three times in his paper. He quite agreed with Mr. Badcock and Dr. Sim Wallace that such a thing did not exist, and he did not mean to imply it. The presence of either one or both temporary molars was quite necessary in keeping the incisors at their proper distance from the temporary molar, so that when the temporary molars were lost in the natural process of eruption there was room for the bicuspid. After the temporary molars were removed the incisors came back in the majority of cases. He had asked for particular attention to be shown to slide 4, because he measured the distance between the temporary canine and the centre of the six year molar just about the time extraction took place, and in a model taken six months later, and there was a decided movement backwards on the part of the canine and the incisor. It was true he had chosen some very bad cases to demonstrate the evils of extraction, yet at the same time he had chosen several good ones also, because in the first place he was very careful to get those cases that Mr. Badcock had kindly lent him and also the case Mr. Chapman had referred to. Although there was a marked over-bite in this latter case there was a very satisfactory result, and yet he did not think it looked quite as nice as the case on the right side of the picture, to which Mr. Chapman re-



ferred. His object in writing the paper was not to show exactly how good a result could be obtained, but to show that there were conditions where the treatment of a case by means of extraction would produce results that gave satisfaction to the patients. There were many cases in Great Britain that had to be treated under conditions where any other line of treatment was practically impossible. Owing to the lack of possibility of permanent retention many cases of Class II., or distal occlusion, occasioned great difficulty in retaining, and unless a man was perfectly certain he could retain the cases soundly after he had treated them, he had better be very careful before he treated on those lines. With regard to Mr. Visick's question as to treatment where temporary molars were impacted, he had shown a case of a persistent temporary second molar, which pretty well described the condition that Mr. Visick referred to. In the first place, in the case of persistent temporary molars, before extraction was resorted to, one ought to be quite sure that there was a permanent bicuspid to come in its place, and if a skiagraph showed that there was a permanent bicuspid coming in its place the distance or amount of absorption of the root ought to determine the period at which the tooth was extracted. If the permanent bicuspid was found to be right under the crown of the temporary molar he should certainly extract it, because it might set up a certain amount of stimulation in that particular area, as Mr. Northcroft had described. He had extracted one or two temporary molars that he thought ought to be extracted, and it was amazing to find how the bicuspid came shortly afterwards, very much sooner than they would be expected to do, inasmuch as absorption of the roots had not taken place to the extent they should have done. With regard to Mr. Chapman's question as to whether the abstraction of the bicuspid was responsible for the marked over-bite of the bicuspid, he was inclined to think, as he saw the condition before and after treatment, that in that particular case it must have been responsible for an increase in the over-bite. Unfortunately he had not the models with him, but he would compare them at some future time. He thought that the over-bite would be brought about by means of a backward movement of the lower canine and incisors due to muscular pressure; also a backward movement of the upper incisor for the same reason. Looking at the models the incisors would have somewhat of a backward curve. He thought the over-bite in the case of treatment was greater than it was before, but he could not say definitely. Mr. Rushton wished to know what was the use of expanding an arch if it would not hold the teeth. Frankly, he admitted that should he get a case of an arch, where he was convinced he could not get the teeth into it, he should extract, but his experience had been very limited, and so far he had managed to get the teeth in. He should be pleased to show any cases in which he had resorted to extraction when he came across them.

A vote of thanks having been accorded to Mr. Lockett for his paper, the Society adjourned.



# BRITISH SOCIETY FOR THE STUDY OF ORTHODONTIA.

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AN ordinary meeting was held in the Rooms of the Medical Society, Chandos Street, W., on Wednesday, 10th February, 1909. MR. GEORGE NORTHCROFT, President, in the chair.

The minutes of the previous meeting were read and confirmed.

THE PRESIDENT drew attention to the fact that at the meeting of the British Dental Association in Birmingham at Whitsuntide there would be a section devoted to Orthodontia, and he hoped the members of the Society would be able to take a part in the work of that Section.

## CLINICAL CASES.

MR. J. G. TURNER showed illustrations of two cases undertaken with the intention of enlarging the palate, and so enlarging the nasal passages. The results showed that actual expansion of the palate was good, but, unfortunately, there had been no accompanying enlargement of the nasal passages. In the first case there was a very fair expansion of the palate, and the teeth had been long enough expanded to assume a more vertical direction than they originally had. The expansion was more marked towards the back of the palate than in front, and in spite of the enlargement the patient still suffered from the same symptoms of nasal obstruction. It was now eighteen months since the palate was definitely expanded, and yet there had been no relief of symptoms.

In the second case the palate was also well expanded, and was kept expanded for a period of over eighteen months, but no relief was afforded to the nasal symptoms and there was no change at all in the configuration of the nose, the *alae nasi* remaining compressed laterally as they often were in cases of nasal obstruction. As the palate was so far expanded as to make the face out of proportion to the nose he had to allow a good deal of the expansion to come in again in order to bring the dental configuration into conformity with the nasal configuration.

Those were the only two cases in which he had tried to enlarge the nasal passages, but he had heard of other people having done it, though he had never seen a definite test as to how it was known there had been any improvement. In the "American Journal of Orthodontia" a very pretty case was given in which the practitioner drew more or less imaginary sections to show how wonderfully he had enlarged the nasal passage, but the thing was

really too good to be true. He wished to know whether any member had had practical experience of improvement that he could definitely put down to enlarging the palate and so enlarging the floor of the nose, and in an indefinite way inducing general growth, whatever that might mean. His own impression was that it was very unlikely that most of the reported cases were anything more than normal growth. For instance, adenoidal tissue might have atrophied, as it often did after the age of sixteen, and, consequently the nasal functions had become restored, the mucous membranes of the nasal passages had shrunk, through better drainage, but he had not been satisfied of an actual enlargement in any case he had seen reported.

MR. HOPSON asked whether Mr. Turner had any experience with regard to the converse of the condition? Where nasal obstruction had been removed had there been any widening of the palate without the insertion of any orthodontia appliance.

MR. RUSHTON showed models of a case he had regulated some eighteen years ago at the time when the child had nasal obstruction and was a mouth-breather. The jaw was considerably wider to-day, though the girl still remained a mouth-breather, and as far as he knew the expansion of her jaw had no action whatever upon her breathing.

MR. J. H. BADCOCK asked the age of Mr. Turner's cases?

MR. TURNER said the first case was just under eighteen when he began and the second sixteen.

MR. BADCOCK thought it was a little difficult to get an idea of the amount of expansion, and it would be as well to have it in millimetres.

MR. BADCOCK thought that in the second case the patient had lost the first molar on one side some time previously and on the other side one recently. In the first case he had not noticed whether all the teeth were present.

MR. TURNER said they were.

MR. RUSHTON asked whether the lower arches were expanded.

MR. TURNER said the lower was expanded in the second case, but not in the first case.

THE PRESIDENT said the measurement was  $2\frac{1}{2}$  millimetres on each side, 5 millimetres in all.

MR. TURNER thought that was enough to expect some betterment in the nose.

THE PRESIDENT did not think it was enough. He had been very much astonished himself at the optical illusion in an expanded model. With Mr. Chapman, he measured up some models some time ago, they were very much surprised at what they found. Looking at the model it would seem that it had been expanded at least a quarter of an inch on each side, but on measurement it was found perhaps only one-sixteenth of an inch. Taking the circle of the jaw, and arranging the teeth as they should be arranged, the circle which would contain the teeth regularly placed, need be very little larger in radius than a circle which bunched up the teeth, and made them very irregular.



MR. TURNER said the relation between diameter and circumference explained the whole thing—it was 3 1-7 to 1.

MR. BADCOCK said two points struck him, first that the amount of expansion was so slight as hardly to lead to expectation of much difference in the nasal cavity, for it would appear there must be a certain amount of tilting of the teeth which would not be entirely made up for by subsequent outward growth of the roots. It would be interesting to know what happened in a case where twice or even three times the amount of expansion shown was obtained across the whole width of the palate. The second point was that in patients between sixteen and eighteen very much growth could not be expected. If treatment had been undertaken earlier there would have been much more chance of growth. It would be valuable to have some actual measurements of the nasal cavity in such cases.

THE PRESIDENT asked whether any member was aware of measurements made of the face from birth to death in one individual. He had not the faintest idea of the difference between the width of a baby's face, and the same face twenty years later.

MR. TURNER thought some information might be obtained from Mr. Galton and Mr. Karl Pearson on that point.

MR. TEBBITT thought that when the nasal passage had been obstructed for eighteen years it could be hardly expected to expand without some definite exercise being inculcated in the patient. He did not think the mere expansion of the palate at that age could possibly affect, except to a microscopical degree, the use of the nasal passage, but if the patient after treatment had been taught proper nasal breathing, deep chest breathing, and so on, he thought there would be greater improvement.

MR. ROWLETT asked what means were used for the expansion. It seemed to him the same amount of pressure on the palate would not be obtained with Angle's appliance as with a plate.

MR. G. THOMSON suggested that if a palate were expanded, it ought to be a valuable aid to surgical treatment.

MR. LOCKETT said he understood that in one of the cases there was an inflammatory condition or more or less nasal obstruction after treatment, and he wished to know whether any precautions had been taken before treatment to establish normal breathing.

MR. TURNER said the patient remained under treatment and still continued to have nasal obstruction.

MR. LOCKETT thought that might indicate that the results of the operation were not satisfactory. He happened to have a case under treatment now which showed before treatment every indication of having suffered from nasal obstruction at some time or other. He asked the father to have an examination of the boy, but the father said that only two or three years ago the nasal cavity had been examined and treated and he did not think there was any ground for a further examination. During the treatment, as there was every indication of nasal obstruction and as the responsibility for the success of treatment would fall upon him, and the father being away, he insisted that the guardian of the boy should

permit an examination to be made. No objection being made, the rhinologist of the London Hospital examined the boy and found that the left nostril had been completely blocked for years and that the right was more or less in the same condition, the septum being deflected right across the nasal cavity.

MR. J. G. TURNER, in reply, said he believed the converse often occurred. He had shown a large number of models at Oxford, where he read a paper on the relation of the movement of teeth to the growth of bone, showing the back part of the palate suddenly enlarged and the second and third molar carried widely apart, leaving the anterior part, including the first molar, the narrowest part of the palate. That was definitely sequent on the removal of the nasal obstruction due to adenoids and the re-establishment of nasal breathing and normal growth. But there was no appreciable enlargement of the front part of the palate; unless the obstruction was removed early enough during the growing period there could be no expectation of growth. Mr. Rushton apparently agreed that no success had been met with. With regard to the measurement of four millimetres, everybody seemed to be deluded by the large area included in the extra diameter. Increasing the diameter of a circle by four millimetres enormously increased the enclosed area. He thought the president would agree that in the particular case mentioned the teeth were in a very good arch, practically a normal arch.

The PRESIDENT said that was so.

MR. TURNER said that being the case, it was obvious that the relation of the palate to the nose had become normal *qua* the size of the palate, and yet the nose had not enlarged. Of course there was something which was not removed in those cases by mere expansion of the floor of the nose; there was the deflection of the septum, mucous membrane, and perhaps enlarged bones that had grown owing to chronic inflammation. Probably the work should be done earlier, but the dentist did not often get the chance of beginning at an earlier stage. With regard to the means used, he used plates, but he was not sure that the same result could not be obtained by other mechanical means, *e.g.*, with Angle's apparatus fixed as close up to the necks of the teeth as possible. With thin edged plates the lips and cheeks would act on the free crowns and the edge of the plate being the fulcrum, the roots necessarily moved out slowly. That was certainly a point in the use of a retention plate rather than retention apparatus of the Angle kind.

#### SOME X-RAY PHOTOGRAPHS.

MR. C. A. CLARK exhibited a series of twenty-seven slides from radiographs. The X-rays, he thought, were a necessity in many cases of orthodontia. Not only might teeth be missing from the arch and hidden away in places where by no other means could they be found, but they might be entirely absent. For instance, central incisors were invariably present in the maxilla, but not so in the mandible. Maxillary laterals were often entirely absent, but not so in the mandible. Maxillary canines were always present, but their irregularity was very great; they might be before or behind the arch, at varying angles or quite horizontal, and as high



up as the apices of the other teeth ; whilst lower canines might erupt as early as ten years or press against the lateral incisor roots. Premolars in both jaws were often absent, usually the second premolar. The X-rays are of great service in ascertaining the presence of both premolars in the mandible before extracting the first premolar for fanning. Six year and twelve year molars in both jaws were always present, but that was not the case with the third molar. Of course exceptions would occur in all the cases mentioned. Again, irregularity might be caused by the presence of an unsuspected supernumerary tooth ; or the obstinacy of a tooth to be rotated or brought into line might be found to be due to malformation of the root. In some cases it was advisable to ascertain before rotating a tooth whether the apex was open or not.

The PRESIDENT thought the society was greatly indebted to Mr. Clark for bringing the slides forward. The radiographs having been taken with films inside the mouth, he wished to know whether Mr. Clark had ever taken them with plates, out of the mouth. He also wished to know if Mr. Clark considered it essential that the rays should always remain in the same position, the head being moved to obtain the desired angle, or whether he would move the rays in relation to the plate. One of the slides was especially interesting, as it showed the extraction of a second temporary molar with a falling back of the first premolar and canine tooth, a result Mr. Turner had described some time ago in a case where the incisors, canines, and first premolars fell backwards and the first molar did not tilt forward to close up the space. There were some very fine specimens of X-ray work to be seen in Professor Symington's Atlas in the library.

MR. CLARK said that in the mandible the radiographs were taken as nearly as possible at right angles, but in the maxilla consideration had to be given to whether the arch was flat or not ; in other words, one had to exercise judgment in each case. It was always more difficult to get the canines when they were buried because they were lying back and the radiograph might just show the cusp and miss the root entirely, or be distorted. The only thing was to take such cases by means of half-a-dozen exposures at different angles, in which case three or four might be useful. With regard to taking the radiographs by means of a plate outside, that was a very good method with the mandible, because it could be tilted up and with a plate it was thus possible to get the rays right under the one side and catch the whole of the other side, but that method was not so successful with the maxilla.

#### CASE TREATED BY SYMMETRICAL EXTRACTION.

MR. W. RUSHTON brought forward as a casual communication models of a case treated by extraction nearly twenty years ago. The models were those taken at the time, and others taken two or three days ago. It was a case of very marked superior protrusion. In those early days it was customary to recommend the extraction of the six year molars, and he extracted four sound six year molars to treat the case. Although it might be contrary to all the canons

of orthodontics at the present day, he thought the members would agree that it was a very good result, both with regard to the position of the teeth and the occlusion. The girl's appearance was tremendously improved. There was still a slight protrusion of the incisors, but that he thought was on account of the girl being still a mouth breather ; *i.e.*, the conditions that had produced the original formation of the jaw had acted after the case was finished, though more slowly. The patient had a deflected septum and did not wish to have any operation, and would probably remain a mouth breather to the end of the chapter. Another point shown in the models was that there was no tilting of the second molars when they came down ; they were perfectly good in alignment. The models also showed that the second molars came forward very rapidly. He pressed back the bicuspid as rapidly as possible, but found from measurements that the amount of space was closed quite as quickly by the twelve-year-old molars coming down as by the bicuspid being pressed back.

The PRESIDENT thought it was very interesting to have such examples illustrating treatment. He should have thought, after such a length of time, a greater amount of attrition would be shown, and that was probably the argument which would be brought forward in these days against treatment of the kind. His own teeth had ground away a good deal, and his bite was not so edge to edge as was shown in the models of Mr. Rushton's case. It looked like a case of thumb or comforter sucking, or that sort of thing.

MR. RUSHTON said it was a case of mouth breathing.

MR. GEORGE THOMSON showed models of a case treated for irregularity by extracting the bicuspid. He also showed a case of a symmetrical extraction, in which the first bicuspid had been removed on the left side and the first bicuspid and the lower on the right side and the centre was thrown more than a quarter of an inch out. He also showed models of a case of anterior protrusion, for which he had done practically nothing except to encourage the patient to use every possible means of cultivating the art of mastication, and a great deal of improvement had taken place.

The PRESIDENT thought it was almost impossible to understand or discuss Mr. Thomson's communication, owing to the absence of lantern slides.

MR. STURRIDGE said he had been struck by the wonderful result Mr. Rushton had obtained. He had seen, only a week ago, a case treated 20 years ago by extraction of the bicuspid and falling back of the front teeth, and there had been a most remarkable result. It was much easier to retain such cases by extracting the bicuspid, getting back the teeth, thus obtaining better conformation and better retention.

MR. LOCKETT asked at what age the first molars were extracted.

MR. RUSHTON said ten and a-half years.

MR. LOCKETT said that was just before the eruption of the twelve year old molar. If the first permanent molars were extracted for caries, or any other cause, about that period, there was no question that it made practically no difference to the denture. The only



difference it made was to reduce the length of the overbite of the anterior teeth later in life. In Dr. Cryer's books on the "Internal Anatomy of the Face," he showed a beautiful case, and used it as a weapon against Dr. Angle.

MR. RUSHTON thought perhaps he had not made it clear that he used regulation appliances to get the result; he did not leave it to nature.

The PRESIDENT, having thanked Mr. Turner, Mr. Clark, and Mr. Lockett for their clinical cases, and Mr. Rushton and Mr. Thomson for their casual communications, the meeting adjourned till March 10.

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# BRITISH SOCIETY FOR THE STUDY OF ORTHODONTIA.

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An ordinary meeting of the Society was held at the Rooms of the Medical Society of London, 11, Chandos Street, W., on Wednesday, March 10th, 1909, MR. GEORGE NORTHCROFT, the President, occupying the chair.

The Minutes of the last meeting were read and confirmed.

Mr. G. G. CAMPION read

## THE REPORT OF THE COMMITTEE ON THE NORMAL ARCH.

BEFORE entering on the work submitted to it by the Council, the Sub-committee, in the first place, drew up the following statement which was submitted to and amended in accordance with the suggestions of the President of the Society.

### PROPORTIONS OF THE NORMAL DENTAL ARCHES (TEMPORARY AND PERMANENT.)

The British Society for the Study of Orthodontia has appointed a Committee to ascertain what work has been done up to the present by way of ascertaining the proportions of the different types of normal dental arches, and applying this knowledge to the treatment of actual cases in practice. It is thought that just as human skulls are classified according to the cephalic index which is based on the measurements of length and breadth, so the study of Dental Arches based also on anthropological methods might be of great service as a basis for the more serious study of Orthodontia. The Society is, therefore, anxious to ascertain whether any measurement of normal arches have been made with this object in view, and will be grateful for any references to papers which have been published on the subject in any language, or for the names of any who have been occupied in a research of this kind.

The Committee would indicate the following as the points upon which they will be glad to have any specific information or statistics, either regarding the temporary or permanent arches:—

1. Relation of length of arch to breadth: What were the methods of measurement, and what points were taken to measure between?
2. Relation of size of teeth to size of arch: What method of determining this correlation was adopted?
3. Height of palate: Points of measurement used to determine this?

Any information bearing on this subject, or reference to papers, will be gratefully received by—

G. G. CAMPION, 264, Oxford Road, Manchester.

H. CHAPMAN, 20, Queen Anne Street, London, W.

J. E. SPILLER, 62, Worple Road, Wimbledon.

This statement was then translated into French, German and Spanish, and has been published in the various dental journals in the four languages.

The Committee regrets to have to report that little research work on the precise lines sketched in this enquiry seems to have been done. Although many statistics of many different measurements of the arches have been compiled, the attempts to correlate them with each other and with the size of the teeth have been few. Many of them also of the highest interest and importance ethnologically are of little value from the point of view of practical orthodontia as they deal with the fully developed arches and cannot be applied to children of eight or nine years of age.

Talbot in his work on "The Etiology of Osseous Deformities of the Head, Face, Jaws and Teeth," gives a large number of measurements of different arches, many of them directed to showing that the size of modern arches is smaller than that of ancient ones. For the breadth of the arches he takes the distance between the most external points of the two first molars, for the length of arch he takes the distance between the centre of an imaginary line connecting the distal surfaces of the third molars and the outer margin of the summit of the alveolar process between the two central incisors. He does not correlate these measurements in any way nor attempt to arrive at any determination of the proportions of a normal arch.

Choquet in a monumental study on the teeth of different races (*Etude comparative des dent humaines dans les differentes races*) takes as the length of the arch the aggregate mesio-distal diameters of the teeth of the entire arch from third molar to third molar. For the breadth he takes the diameters across the palate between (entre) the three molars and two premolars. This study, although of the greatest interest from the point of view of Ethnology, has little bearing on the subject of our investigation.

To A. Pont, of Lyons, belongs the credit of first publishing a definite attempt to correlate the size of the teeth with the size of the arch in skulls and living subjects. For this purpose he takes the aggregate mesiodistal diameters of the four upper incisors and forms (1) a premolar and (2) a molar index, thus:—

$$\text{Premolar-index} = \frac{\text{Diameters of incisors} \times 100.}{\text{Distance separating 1st premolars.}}$$

$$\text{Molar index} = \frac{\text{Diameters of incisors} \times 100.}{\text{Distance separating 1st molars.}}$$

The measurements from premolar to premolar are taken from the median fissures and from molar to molar from the centre of the crowns. He finds constant ratios of from 78-82 (premolar index) and 60-65 (molar index). He takes no measurement of the length of the arch nor does he indicate the number of cases of which he gives the summary.



We are indebted to Dr. Pont for the following table which he has recently worked out :—

SCALE FOR THE NORMAL DENTAL INDEX.

Premolar Index 80 ; Molar Index 64 ; the diameter of the Incisors being :—	The distance which must separate the coronal sul- cus of the first premolar on the right from the same point of the first premolar on the left will be about as follows :—	The distance which must separate the centre coro- nal pit of the first molar on the right from the same point on the left will be as follows :—
25	31	39
25.5	32	39.8
26	32.5	40.9
26.5	33	41.5
27	33.5	42.5
27.5	34	42.9
28	35	44
28.5	35.5	44.5
29	36	45.3
29.5	37	46
30	37.5	46.87
30.5	38	47.6
31	39	48.4
31.5	39.5	49.2
32	40	50
32.5	40.5	50.80
33	41	51.5
33.5	42	52.3
34	43	53
34.5	43.5	53.9
35	44	54.5
36	45	56.2

Campion takes for length :—

(1) An oblique measurement from the mesial extremity of the cutting edge of the central incisor to the centre of the distal margin of the masticating surface of the first molar on the same side.

For breadth :—

(2) The points most distant from the middle line on the buccal surfaces of the two first bicuspids.

He expresses the relation of length to breadth by an index computed like the cephalic index.

$$\frac{\text{Breadth} \times 100}{\text{Length.}} = \text{Breadth index of the arch.}$$

Distributing the cases in columns after Galton's method he finds in 83 cases a mean breadth index of 107 to 110.

To correlate the size of the teeth with the size of arch he takes the width of one central incisor at its widest part and divides this into the bicuspid breadth, measurement.

$$\frac{\text{Bicuspid Breadth of Arch}}{\text{Width central incisor.}} = \text{Incisor bicuspid ratio.}$$

In 136 cases the ratio thus obtained shows an approximate mean of 5.3 and a mean variation equal to about half the width of one central incisor. This relation would seem to be less constant than those indicated by Pont. The method, however, is more simple than that of Pont for every day use.

Here then in four different observers we have three different methods of computing the length of the arch and three different methods of computing the breadth of the arch. With methods so diverse it is little wonder that the results are impossible of comparison and until some agreement has been arrived at as to method of investigation we are unlikely to acquire sufficient material on which to base any sound generalization.

Attempts have also been made following somewhat on the well-known lines suggested by Bonwill to construct a normal arch by geometry (Hawley, Gysi, Herber), and although these are based on definite correlation between the size of the teeth, and the size of the arch the attempts savour more of invention than of investigation, and as such seem beyond the terms of reference to the Committee. Such attempts might have been justified in pre-Darwin days when the archetype theory dominated the science which is now known as biology, but ignoring as they do all racial differences and disregarding modern anthropological methods they cannot in the opinion of the Committee be regarded as of value from any scientific standpoint.

In conclusion, your Committee is of opinion that in order to obtain the necessary statistics on which to base a classification of different types of arches or a mean normal type it is desirable:—

(1) To enlist the help of those in different countries who are interested in the subject, and

(2) To agree on certain points of measurement so that all can work on the same lines.

To this end it suggests that the Council of the Society should either decide on some definite series of measurements to be adopted or should strengthen the Committee for the purpose of suggesting such measurements and further that the subject should be brought before the International Dental Congress to be held in Berlin in August.

The Committee is also of opinion that the measurements decided on should be such as can be made with an ordinary pair of sliding callipers either in the mouth itself or on models.

We have not ventured to go in much detail into many of the important points which have been already raised in material published, because to have done so would be in our judgment to have obscured the main point we would enforce, viz., that it will be impossible to obtain the necessary statistics until methods of measure-



ment have been decided on which all engaged in the needful investigation can uniformly employ. Until this has been done the individual investigator must be perpetually deterred and hampered by doubts as to the ultimate utility of his labour, but with these points arranged by mutual agreement we feel that there should be no great difficulty in obtaining particulars of say 500 complete arches.

MR. CAMPION, at the conclusion of his paper, read a letter from Mr. E. B. Nicholls, an Australian practitioner, who wrote that in Melbourne, Sydney and Adelaide, there were a number of aboriginal skulls in the Natural History Museums which he believed would yield valuable comparative statistics, and asking for instructions into the methods that were followed by the British Society for the Study of Orthodontia and the standards of measurement that were being adopted, in which case he would have pleasure in making a survey of the crania and forwarding the results to the Society. He himself would undertake the survey in Victoria, and in course of time make arrangements to have the same work carried on in the sister states. For some time he had contemplated taking such a step, but lack of knowledge as to the best method of making measurements that would be of value had prevented him going further. He pointed out that in October of this year the Second Australian Dental Congress was to be held, at which he desired to bring the matter before the notice of the profession. The letter went on to say: "I have been paying a visit to the native settlement, where the remaining aborigines, about eighty in number, are kept at the Government expense. I found their teeth in a deplorable condition. Generally speaking, the dental arches were full and well formed, and the prognathous character of the face very marked. The wisdom teeth were better developed than those of the patients I meet in daily practice. These aborigines have been feeding all their lives upon beef and mutton and white bread, and I found caries just as rife as in a white community. There is no doubt but that the use of the softer foodstuffs accounts for this, and the prevalent decay amongst the aborigines confirms the statement to that effect made by the Secretary of the British Dental Association before the Physical Degeneration Committee in 1904."

The PRESIDENT, in expressing the indebtedness of the Society to Mr. Campion for bringing the Report of the Committee forward, thought that the Society was to be congratulated upon the initiation of the Committee. He thought Mr. Campion had made it very clear that the whole profession required to be informed of the best method of making the measurements and the necessity that existed for a carefully thought out scheme. Mr. Campion had referred to the work of Hawley, and others, and in a little pamphlet that had been circulated recently, entitled "Orthodontia," measurements were mentioned as being made on the Herbst principle, though he had never heard of Herbst in connection with any orthodontia measurements. He was rather taken aback to hear that the Committee recommended discarding all special instruments, because he happened to have recently constructed one himself, an instrument which was a very simple one for measuring

the depths of palates, and he thought it would be found very difficult to make such a measurement without some such instrument.

MR. CAMPION said that no special instrument was recommended because of the difficulty of designing one. Perhaps Mr. Northcroft had solved the difficulty.

The PRESIDENT said that when men were making the measurements of skulls in museums it involved very little further labour to measure the depth of the palate, and the information might be of value in relation to the correlated measurements of the arch. In the instrument he had referred to the length of the arch was taken from a point midway between an imaginary line drawn in the case of the permanent teeth between the palatine fissure of the first upper molars, and in the case of the temporary teeth between the palatine fissure of the second temporary molars. A line was projected from that line at right angles to a point between the cutting edges of the two central incisors, and from that same point the depth was taken. He quite agreed with the Committee that the recommendation of any special instrument was undesirable, and therefore he would say nothing further upon the point.

MR. J. G. TURNER hoped the Committee would not think he in any way wished to criticise their work, but his first thought was: What are we driving at? Was it an endeavour to make measurements which should give a curve of variation or determine the limits of normal variation; or was it an endeavour to find measurements that should be useful in practice. Such measurements as he had indicated were useful scientifically, but hardly of value in practice. Or was an attempt being made to find measurements which could determine what was to be normal to the individual. In the latter case it became to his mind merely a matter of taste. It was easy to judge what was normal, to the individual, what suited the features, and whether any improvement could be brought about, but he saw no possibility in the living subject of determining what should be the normal relation of one part of the face to the rest of the face. In a dead skull, however, he thought information might be obtained by taking, for instance, such a point as cranial capacity in relation to the length of the arch. That might be done by weighing the amount of lead shot that a skull would hold and comparing that with a measurement such as Choquet used, from one end to the other of the arch of the teeth. That would give an indication of the way the jaws were being diminished in relation to the increasing cranial capacity of man. There were other measurements that might be conveniently taken on a skull, though he did not see how they were to be taken in a living subject. For instance, the question of prognathism did not always depend on the curve in the front part of the jaws, but on the procumbency of the incisors, so that a relation had to be established between the size of the bony base and the size of the arch in the manner adopted by Choquet, or between the anterior-posterior as adopted by Mr. Campion. That would be interesting, but he did not see how it would be useful in daily practice. He was inclined to think that in daily practice it would be far better to use one's own judgment and trust to the profile.



The PRESIDENT said the work of the Committee had been before the Society for over a year, and by this time the members should have made up their minds whether the measurement of the arch was desirable or not. He felt that there was a good deal in what Mr. Turner had said, but at the same time he had been astonished at the help he had received from the callipers in daily practice. He did not think it was right to say the eye was always a good or a reliable guide in the work. It was surprising how often his own eye had been deceived, and he never depended on it alone.

MR. CHAPMAN felt in the same position as Mr. Turner. He thought another answer to the question: What are we driving at, was to say that it was an attempt to find a mean of arches. In considering the normal arch it was necessary to have a definition of it, although he did not know where such a definition was to be obtained, or who was to make it. Every arch that was normal could only be normal to itself. In the introduction to a recent work on the "Races of Man," Deniker said: "Every country has its own variety of physical type, language, manner and custom;" therefore in every set of arches the physical type would be an important thing. Further on, however, the same author said: "Most frequently we have to do with subjects whose forms are altered by blendings and crossings, and in whom, setting aside two or three typical traits, we find only a confused mixture of characters presenting nothing striking," a statement which meant that every arch practically must be composed of a confused mixture of characters presenting nothing striking. In addition to type, which probably included race, there were other things, such as temperament. Choquet, from his investigations, had said that he could tell whether any skull was male or female; if so it was a very extraordinary thing. Another point he wished to bring out was perhaps rather beyond the scope of the Committee. Pont took as the standard of his measurements the incisors, but he did not refer to the temporary teeth, and therefore until the subject attained the age of seven the measurements were not possible. There was also the question of the relationship to be taken when there was a permanent molar and a temporary molar as well. In that case perhaps the measurements should be taken twice, from the mesial point of the incisor to the temporary molar and then to the permanent molar. If it were possible to get the changes that took place later on it would be very interesting, although it was rather beyond the actual scope of investigation. In order to be able to measure easily to the distal surface of the molars much smaller and narrower callipers were required than any in use at present.

MR. J. H. BADCOCK thanked the Committee heartily for the work it had done on the subject, and expressed his admiration at the extremely scientific spirit in which it had gone to work. Thanks were also due to the Committee for having laid down the necessity of standardising measurements, and if it did nothing else than that it would earn the gratitude of orthodontic science for all time. With regard to Mr. Turner's remarks about the utility of a normal arch if it could be obtained, he took it that what the

Committee were trying to do was to arrive at what might be called a standard of average normality. As Mr. Chapman had said, every individual was normal only to itself, but he thought in practice it was a very great help to have an ideal for any particular arch which was roughly correct, so as to be able to say that one would expand an arch so many millimetres and to set one's apparatus to carry out the work. Very often the apparatus had to work while a child was at school, and when the child came back the expansion decided upon might have been obtained, and a decision then had to be come to as to whether the expansion was or was not sufficient. It would not be a matter of very great difficulty in that way to arrive at an arch which could be symmetrical with the other features of the face. With no such guide it became a matter of mere guesswork, and the eye was easily deceived. It meant that before the normal arch was attained the face had to be seen many times, and many alterations made, and the whole thing was more tedious and less certain. He thought the profession was indebted to Mr. Champion for a scale of measurements that in practice had proved very useful, and thanks were also due to Dr. Hawley for the arch he had described, because although, as Mr. Champion said, it did not seem to depend on a very scientific basis, still it was roughly approximately right, and, at any rate, went sufficient in that direction to be very useful in practice. He believed the set of measurements Mr. Champion had put forward was distinctly more valuable because it was based on certain data.

MR. W. RUSHTON thought that if the members of the Committee were to agree amongst themselves that there were a certain number of standards of types, and those were published so that any person in referring to the standards would see approximately what he ought to aim at, it would be an extremely practical thing; but to take the width of a central incisor and from that by some formula to work out what that arch should be, seemed to him a fantastic performance. The width of the incisors was extremely variable in various mouths. It would be much nearer the mark to take the central and lateral as a standard, because in practice it was found that those two teeth very often differed in a certain ratio.

MR. MELLERSH remembered having seen cases where the lateral on one side was not the same as the lateral on the other, and he asked how Mr. Rushton would propose to deal with a case of that kind.

MR. RUSHTON said he thought that even in that case the average would be nearer than to take the central alone. But if the suggestion were carried out neither the central nor lateral would be taken. A certain type would be figured and measured and within certain limits that ought to be quite near enough for any man to work to.

MR. SPILLER said he had been very much struck during the work of the Committee with Mr. Champion's thorough grasp of the subject, and he believed if Mr. Champion would only let himself go he would thoroughly convince every member that his deductions were quite accurate.

MR. CAMPION, in reply, said there was some reference to Herbst's



work in the portfolio of material which would be placed in the Archives of the Society, and he hoped a good many members would study it. With regard to a special instrument, the Committee agreed that the depths of the palate could not be measured without such an instrument, but the difficulty was as to the points of measurement. Dr. Grevers, of Amsterdam, had measured nearly all the skulls in Europe that were known to have been a definite age at the time of death, travelling all over Europe in order to measure the skulls and obtain data for forming opinions upon the growth of the jaws. Unfortunately Dr. Grevers had not published his work, but he had seen the measurements, taken with the utmost exactitude by means of many specially designed instruments, and he has been astonished at the monumental work Dr. Grevers had done. In measuring the depth of the palate Dr. Grevers measured from the neck of the second temporary molar to the height of the vault, and took the mean of three separate measurements in order to eliminate, as far as possible, any error due to personal equation. That measurement was compared with later skulls when the permanent teeth had erupted, the measurement being made similarly from the neck of the second bicuspid. Talbot had also made a number of measurements of the palate, with a special instrument measuring from the intermaxillary space between the first molar and the second bicuspid at the gum margin. It appeared that any point taken for the measurement must be a variable point, because it was very difficult indeed to obtain a point from which there could be eliminated the personal equation of a large number of observers. That was really the reason why the Committee made no special recommendation on the subject, and he should be very pleased to see the instrument which the President had designed. With regard to Mr. Turner's remarks, Mr. Turner had stated exactly what the Committee was driving at when he mentioned a curve of variation. It was an attempt to find a curve of normal variation. Further, it was desirable in order to differentiate between different types of arches just as anthropologists differentiated between different types of skulls. That was done by correlated measurements, and he saw no reason why the same method should not be pursued in regard to arches. As a matter of fact different types of arches were recognised and particularised in the books; there was the oval arch, the round arch, the square arch, the saddle arch, and the V-shaped arch. Those arches were not normal, but were recognised more or less in practice, and his point was that the investigation should be set about in a little more exact fashion than hitherto had been done. It appeared to him that it would be a real gain to be able to differentiate in a scientific manner between the different forms of arch. It was quite true that prognathism did not depend upon the face, but an examination of a number of skulls would show that it depended on other things besides what Mr. Turner had mentioned. It depended a good deal on the size and position of the foramen magnum. Skulls would be found in the College of Surgeons which did not answer at all to the text book classification, simply because the foramen

magnum was abnormally large. As Mr. Turner had pointed out, there always was, and always would be, enormous variation in individuals, but that did not preclude the possibility of the existence of different racial types. For instance, he never saw a Japanese without desiring to measure his dental arch; the Japanese were of a broad-headed racial type, and he wanted to see whether the dental arch corresponded with the type of head, whether there was any correlation between the breadth of the head and the breadth of the arch. He hoped, when the Report was published, to send it over to Japan, and have some measurements made there. With regard to the value of the callipers in ordinary practice, he was very glad to hear what had been said by the President, because for a great many years he had himself found them of very much use. His own workroom assistants used callipers, and he simply told them that he wanted a variation of half a millimetre and whatever it might be, and they knew at once what he meant, and he found that having definite measurements to refer them to was an immense comfort and gain. The eye was not reliable. Mr. Chapman had opened up a large and important question bearing very much upon the subject under discussion. As far as he could make out the relation of the temporary teeth to the permanent teeth was not known, and it seemed that the only way in which anything could be learnt about it was by obtaining models of the same mouth at different ages. A series of measurements of such arches would be of great scientific value. There was a set in the College of Surgeons Museum which Mr. Tomes examined most carefully a good many years ago and published a paper upon in the Transactions of the Odontological Society. Mr. Rushton objected to taking the incisors as a gauge; it did seem utterly fantastic at first sight to take the width of one central and to think there was any ratio between that and the breadth of an arch, but it was a phantasia that he personally had been guilty of, and he was quite willing to laugh at it with Mr. Rushton. He took it as an extreme point, because he wanted to test whether there was anything in it or not, and he found there was really something in it, that there was a more or less definite ratio between the width of one central and the width of the entire arch, unlikely as it might seem. Of course the variation of the individual came in very largely as had been already mentioned. The laterals were very variable teeth, and as Mr. Rushton quite truly said there might be some appearance of rationality in taking the centrals and laterals and correlating them with the breadth of the arch. But when the thing was worked out, taking one central alone was not so fantastic as at first sight appeared, and personally he found it useful in actual practice. The normal variation was only a variation of half a width of a central. The bicuspid breadth was from five to five-and-a-half times the width of one central. That was not a narrow variation compared with the variations found in irregularities. Personally he found the ratio of use in actual practice. When a child came with the six year molars erupted and a central erupted and possibly with the laterals erupting, he frequently measured the width of a central



incisor, and multiplying that by 5.3, which he found to be the mean, he reckoned approximately what ought to be the width of the first temporary molars. An unknown quantity came in, but Mr. Tomes in the skulls of the College of Surgeons found that the width of the arch across the temporary molars was only about a millimetre between early and late life: the width across the bicuspid late in life when the twelve year molars had erupted was only one millimetre more than in the preceding temporary molars. Multiplying the width of the incisor by 5.3 gave what the bicuspid ought to be later in life, and if the temporary molars fell very much short of that he simply put in an expansion plate and began expansion before the lateral incisors had erupted. In that way it was possible to tell somewhat approximately what the width of the arch ought to be later on in life, and begin treatment when the maxillae were more amenable to treatment.

The PRESIDENT again thanked Mr. Champion for bringing forward the results of the Committee's work, and said he hoped the work would be recognised both in England and abroad, and that some practical good might be the outcome of it. The Society was anxious to put the whole thing on a scientific basis, and he thought if, as Mr. Badcock said, the profession at large could be shown that the Society was in earnest and were working on right lines a very good purpose would be served.

The meeting then adjourned.

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## ORDINARY MEETING.

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AN ordinary monthly meeting of the Society was held at the rooms of the Medical Society of London on Wednesday, June 9th, 1909, Mr. George Northcroft (President) occupying the chair.

The minutes of the previous meeting were read and confirmed.

Mr. Ernest D. Bascombe, L.D.S.Eng., of Bournemouth, was elected a member of the Society.

THE PRESIDENT brought to the notice of the meeting a little plane-blade sharpener introduced by a workman in the employ of Messrs. Ash, based on a sharpener demonstrated by Mr. Visick at the last meeting.

MR. NORTHCROFT then read

SOME OBSERVATIONS, ILLUSTRATED BY SLIDES, ON THE MOUTHS OF  
TWENTY-FIVE CHILDREN FROM TWO AND A QUARTER TO SIX  
AND A HALF YEARS OF AGE.

A paper was then read

ON THE USE OF X-RAYS IN DENTISTRY,

by DR. IRNSIDE BRUCE.

DENTAL radiography has always appeared to me to give somewhat disappointing results, and I cannot help thinking that it would be of great advantage if some definite method of examination was made use of. I propose, therefore, to bring to your notice a method of X-Ray examination which promises well.

The Atlas of Symington and Rankin, which I am sure is familiar to all of you, shows the quality of radiogram which should be aimed at. In this Atlas it is true the radiograms have been secured with dry bones and half the skull removed, yet I can see no reason why in the living subject, just as sharp shadows should not be obtained. Beautiful demonstrations of the position and relation of the teeth, similar in appearance to those produced in the Atlas are often obtained accidentally in making examinations of the skull for other purposes. If in every case such views of the teeth were possible, then I think X-Ray examination would prove to

be much more valuable to the dental surgeon than it is at the present time. In dealing with other parts of the body, I have found it a great advantage to secure in every case a shadow which is identical. In other words, the relation between the X-Ray tube and the part to be examined is in every case automatically the same and the shadow produced is therefore also the same. For example, in making an examination of the ankle joint, the limb having been placed in a prescribed position, the anode of the X-Ray tube, that is, the actual source of the X-Ray, is placed in accurate relation to the internal malleolus by a simple mechanical contrivance, the details of which I need not trouble you with. Thus the relation between the tube and the part of the body to be examined can always be reproduced, and further, the shadow of a normal ankle joint can be obtained, which affords an opportunity of studying the normal appearances presented by the part. In this way then one is able to select not only the best view of the part for the purposes of diagnosis, but the shadow being familiar, any abnormality is easily recognised, and should any doubt remain, it is always possible to compare normal with abnormal.

Let me now show you, first, the radiogram of an ankle joint which has been secured with the tube in no known relation to the part examined (Fig. 1), and, second, the radiogram of the same ankle joint, secured with the tube and the part in a known and selected relation one to the other (Fig. 2). You will notice that the quality of the second radiogram is quite remarkable when compared with the first, which is flat and altogether wanting in detail. Yet both these radiograms have been taken from the same ankle joint, under similar conditions with the important exception I have already stated.

The usual way of dealing with dental cases has been to place a film suitably protected inside the mouth and to hold it in position during exposure, the X-Ray tube being placed on the same time some distance away, but not in a fixed or known position. If the principle I have described to you is to be made use of, it is necessary that the practice of placing the film inside the mouth should be abandoned. The only real objection to having the plate outside the mouth is that the tube has to be so placed that the teeth of the opposite side come between the tube and the plate, and they, especially when they are liberally stopped, cause shadows, which are rather confusing. In Symington and Rankin's Atlas the radiograms have all been secured with the plate outside the mouth but the teeth of the opposite side were removed. It is possible, however, in the living subject by placing the head at certain angles to avoid the confusion caused by the teeth of the opposite side, and if these angles can be reproduced, definite and known shadows can in any case be secured. With the film inside the mouth, accuracy is impossible. One has only to remember, in the case of the superior maxilla, the relation that it bears to the alveolar process of the jaw to realise that the film must of necessity be placed at a very wide angle with the long axis of the teeth, and that the shadow thus obtained must be much distorted.

Using the film inside the mouth is unsatisfactory for other





1

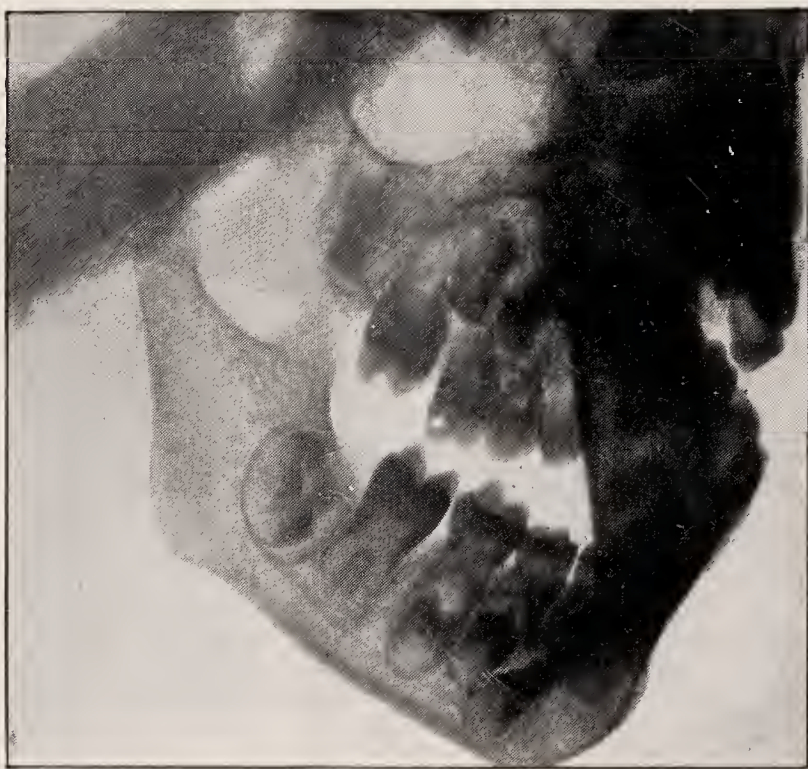


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TO ILLUSTRATE DR. BRUCE'S PAPER.



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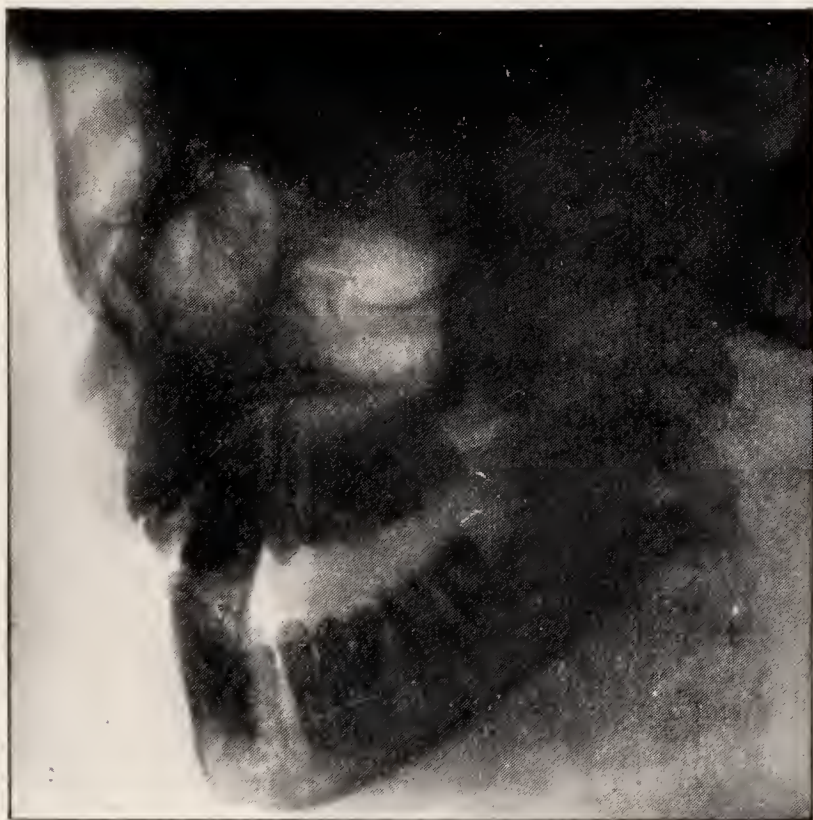
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TO ILLUSTRATE DR. BRUCE'S PAPER.





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TO ILLUSTRATE DR. BRUCE'S PAPER.





reasons. It is often difficult in a subject in whom the arch of the palate is shallow to secure a shadow of the whole length of the teeth, and if, in addition, unerupted teeth are in question, it is impossible to get a proper idea of the position and relation of these to the other teeth. In dealing with the last molar teeth in the upper jaw, the film may often fail, because it is necessary to get it into position to bring it very close or actually in contact with the fauces, thus causing involuntary movements on the part of the subject, which very much detract from the value of the resultant radiogram.

In dealing with the lower jaw the movements of the tongue are apt to produce indifferent results. Finally the film inside the mouth cannot be placed accurately, and certainly in relation to the alveolar process in every case.

Let me show you in the next lantern slide a radiogram of a dental case which has been secured with the film placed inside the mouth. It shows the permanent canine erupting without absorption of the root of the temporary canine. The purpose of the examination in this case was to decide the presence or absence of the lateral incisor, and it is obvious that the conclusion arrived at could not be said to be correct, because the apex of the roots of the permanent canine and incisor are not shown, and therefore the unerupted lateral, if it be lying above that level, would not be demonstrated.

Outside the mouth an ordinary glass plate can be brought into close opposition with the teeth. It can be placed accurately in the same relation to the bones in every case. The position of the X-Ray tube and the head can be defined and so the shadows found to be most useful can be reproduced in every case.

The real difficulty still remains in the angle at which the head has been placed to get the teeth of the opposite side out of the way, and since all the teeth do not lie in line one with the other, the angle of the head must be further altered according to the particular teeth which are to be examined. Thus different positions are required for the molars and premolars, incisors and canine, upper jaw and lower jaws. The necessary positions of the head and the X-Ray tube to secure the best views have been partly worked out by Mr. Northcroft and myself. By means of a machine we have attempted to hold the head, and thus to place it in definite positions. There have arisen, however, practical difficulties which we hope soon to overcome, and it is possible that eventually we will have to fix the head and plate in one position and arrange an apparatus by which the tube and the tube only can be placed in definite positions in relation to the stationary head and plate.

We have been much encouraged by the results so far. Fixing in our machine a dry skull we were able to find out the positions of the head plate and tube, which give the best results. Let me now show you in the next slide a radiogram of the dry skull which shows well the erupting permanent teeth and the angle of the lower jaw. The upper teeth being also fairly well defined. The quality of the radiogram compares favourably at any rate, so far as the lower jaw is concerned, with those to be found in Symington and Rankin's Atlas. (Fig. 3).

The next slide is also of the dry skull and demonstrates the crowded arrangement of the permanent molars and canine with erupting premolars and the crypt of the 2nd permanent molar.

In these radiograms the outline of the teeth *it is true* shows some distortion, but since we proposed to secure all radiograms with a known and reproducible relation between the X-Ray tube and the teeth the distortion will be in every case the same.

It will be possible, therefore, to estimate in any case *how much* distortion is normal and *how much* is due to irregular disposition of the teeth. I have had the opportunity of examining certain cases in the living subject, and although our machine was not sufficiently complete to deal with these, by working out the positions roughly by the eye, fair results were obtained, and I now propose to show you some of them.

Before doing so I would ask you to bear in mind the difficulty of demonstrating radiograms by lantern slides. The loss of detail is exceedingly great for photographic reasons. I would like you therefore later to look at the original negatives in a proper light.

The next slide is that of the upper jaw of a child about eight years old. You will see the temporary pre-molars in situ, the molars and permanent canine unerupted.

The next is one of the upper jaw showing the absence of the permanent lateral incisors.

The next shows two bedded roots in the lower jaw.

The next shows the permanent unerupted lateral pressing on the absorbed temporary canine with the permanent canine pressing on the apex of the permanent lateral causing it to tilt backwards, also showing the unerupted pre-molars in both upper and lower jaws.

The next shows the result of early extraction with the excessive tilting of the 2nd permanent molar, the first pre-molar erupting very late. The wisdom tooth can be beautifully seen forming in its crypt. (Fig. 5).

The next shows the teeth of the lower jaw, the temporary molars in situ with the erupting premolars and permanent canine.

The next shows the upper and lower jaw with wisdom teeth growing in their crypts. Note the excessive space between the 2nd premolar, and 1st molar roots of the lower jaw.

The last one is that of an abscess in the lower jaw in connection with the root of the lower lateral incisor. (Fig. 6). The root canal is plainly to be made out filled with opaque material.

I cannot conclude without expressing my indebtedness to Mr. Northcroft for the valuable knowledge he placed at my disposal. Indeed had it not been for his help I should not have been in a position to have read this paper to you.

The PRESIDENT was sure every member felt extremely indebted to Mr. Bruce for the trouble he had taken in preparing the paper and the beautiful specimens used to illustrate it. For his own part he was convinced that Dr. Bruce's method was the only correct method of taking radiograms for dental work, and he wished Dr. Bruce every success in his further investigations.



DR. BRUCE exhibited a series of X-ray photographs, and explained in general conversation his method of work.

A hearty vote of thanks was accorded to Dr. Bruce for his Communication.

The meeting then adjourned.

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## ORDINARY MEETING.

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AN ordinary meeting was held at the Medical Society's rooms, Chandos Street, W., on Wednesday, July 14th, 1909, MR. GEORGE NORTHCROFT, the President, occupying the Chair.

The first portion of the evening was devoted to clinical demonstrations.

MR. HEDLEY VISICK showed the models and slides of a case of a girl, aged fifteen, living in Ireland. There was no history of mouth breathing. The teeth occluded only in the incisor region where there was an edge to edge bite, and in the second molar region. The upper canines were biting lingually to the lower canines. The maxilla presented a contracted appearance, whilst the mandible appeared to be well developed, with large inter-dental spaces. The lower left second bicuspid was rotated almost 90 degrees. Two opinions had been expressed relative to the cause of the deformity. The first was that the inferior protrusion was not due to malposition of the teeth, but to abnormal growth of the lower jaw. The other opinion was that the maxilla, being under-developed, had acted as a wedge, and aided by the tongue, had forced the lower teeth apart. It was considered that the deformity was due rather to lack of growth of the upper than to abnormal growth of the lower. Two methods of treatment had been suggested, the first being the use of upper and lower arches with reversed reciprocal retraction, expanding the upper jaw and contracting the lower. That method, however, could only be adopted provided the patient was able to make regular visits. Failing that, the second method suggested was to have skiagrams taken of the lower wisdom teeth in order to diagnose their position, and if there seemed to be a fair chance of those teeth erupting normally to extract the lower second molars, so as to obviate the pushing forward of the anterior teeth by the incoming third molars, and possibly to obviate the growth of the mandible. The maxilla would be expanded by means of a spilt plate, by which method it was hoped that the bite in the premolar and molar regions would be improved, and possibly the protrusion of the mandible. The curve of the lower dental arch was found to be 105 mm., the measurement being taken from the distal surface of the second molar, through the

middle line of the teeth to the distal surface of the other second molar. The aggregate of the mesiodistal measurements of the teeth themselves were 99.5 mm., which gave 5.5 mm. as the total of the interdental spaces. As to the cause, he thought probably the tongue was very largely responsible for the abnormal development of the lower jaw or the abnormal spacing of the lower teeth. Unfortunately not having seen the patient, he could not say. It was also difficult to know whether the tongue was large or small. He did not think the maxilla could act as a wedge, as the upper bicuspid did not actually touch the lower teeth, the bite was also edge to edge. He thought the idea of reversed reciprocal traction was excellent. With regard to taking out the second lower molars to keep the lower jaw from being further protruded by the incoming of the third molar, he thought that was not quite sound treatment under the conditions. He thought if the upper incisors were lifted out over the lowers, or the lowers pulled inside the uppers, the whole force of the bite would come on the back molars. At present there was very little strain on the molars. He thought it would be quite justifiable to cut in the bite.

THE PRESIDENT said that where a case of malocclusion was complicated by an open bite it always presented many difficulties. Although the statement was made over and over again that teeth could be satisfactorily elongated, and would stay elongated, he had yet to see a case that was completely satisfactory. He did not know whether, if an arch were used to expand the upper jaw, and the upper premolars were elongated at the same time, that this condition would remain permanent.

MR. J. H. BADCOCK said that his experience of the treatment of open bite had not been very satisfactory. He mentioned a case in which he elongated bicuspid in both jaws by means of bands attached to studs on the upper and lower, which drew the teeth into contact and produced a very nice result, but the method was stopped too early, and although the teeth were now in a much better position than at first, they were not in anything like so good a position as they were at one time. There was a distinct tendency to relapse. It was quite probable that if they had been retained longer, a matter of months instead of only three or four weeks, they might have been permanent. With regard to cutting in of the bite of the back teeth, it had always seemed to him that in some cases of open bite it was the only way of treating them, and it would be perfectly justifiable, if necessary, to devitalise two of the molars, one on either side, if it were impossible to do it otherwise. To hope that the back teeth would bite down in a child of that age was to hope for a great deal. Personally he was much inclined, if the teeth were propped open on the back molars, to cut them down to begin with.

THE PRESIDENT asked whether Mr. Badcock would prefer to cut the teeth down rather than extract them, in the hope that the third molars would take their place.

MR. BADCOCK said he was inclined to cut in the bite, because the third molar was an uncertain quantity always, both as to size and as to date of eruption, and it might not erupt at all. Cutting



in the teeth would do no harm, even though two of the molars had to be devitalised. If the teeth were properly filled they would be useful throughout life.

THE PRESIDENT said it was suggested that the removal of the second molars would arrest the development of the lower jaw. MR. VISICK considered that the lower jaw was still developing, and that the chances were that when the wisdom teeth erupted the lower jaw would be still larger, and instead of the inter-dental space closing up the protrusion would be more marked, quite an excessive Class III. case.

MR. HEDLEY VISICK asked whether it was not considered that the lengthening of the lower jaw took place behind the second molar when the third molar came into position, and that the lower jaw did not get pushed forward, and the bone was absorbed on the anterior surface of the ascending ramus and deposited on the posterior surface. That being so, it would be absorbed on the anterior surface and deposited on the posterior surface any way when the third molar erupted, regardless of whether there was a tooth in front or not.

MR. SPILLER said in cutting the molar teeth he thought the condition would be made worse than it was before.

THE PRESIDENT took it that the expansion of the upper arch would go on simultaneously with the removal of the second molars or the cutting in. It was essential that the upper arch should be expanded.

MR. SPILLER said that that made a good deal of difference. He had had some extraordinary experience of the bite resting entirely on certain teeth. In one case in an adult the bite rested entirely on the wisdom teeth, and was open in the front of the mouth by at least a quarter of an inch, and the man could only masticate on his four wisdom teeth. He ground one of them, and the front teeth practically just met. In treating a case of that kind from the practical point of view it was of great importance to know how often the patients could come for treatment, because the patient should be under observation for at least a year. The fact that the case referred to by Mr. Visick lived in a remote part of Ireland had to be taken into consideration. If she could not be seen regularly it would be as well to leave the case as it was.

MR. BADCOCK said he had a case some years ago of a young man about twenty with a considerable open bite, perhaps  $\frac{1}{8}$ -inch. The patient complained that he could not bite his nails, and the interesting point was that he had been able to do so until within a very short period of his coming for treatment. The raising of the bite took place quite suddenly. The bite was raised on the second molars, which were very carious. He had seen the same thing occur twice in much older persons. He had seen a lower tooth which rose up in a night, and had to be extracted before the bite would be closed. He had come to the conclusion that a bite might alter very considerably in adult life from causes which had not been explained.

THE PRESIDENT said that with the exception that the members seemed to favour the cutting in of the second molars, no idea of

treatment had been given. He thought the contraction of the lower arch could be undertaken with a patient of that age who could look after an apparatus fairly sensibly, although she could not come often for treatment. If a patient was living in a part of the world where no treatment was obtainable, the case would have to go untreated.

MR. FLOYD (Cape Town) said the case had interested him in connection with the case of two sisters, patients of his, in whom Nature had done something towards remedying what looked like being a case of superior protrusion, a case of Class III. in the one sister, while the other was a very marked case indeed of inferior protrusion. The mother was also a distinct case, and there seemed to be no doubt at all about the inherited tendency. The eldest sister had a very badly contracted maxilla, and the younger sister lost her lower molars at an early age. In both sisters the bicuspid failed to meet. The younger girl, who had a good profile and had her lower incisors just within the upper incisors, was a case of an early loss of the six-year-old molars, and he ascribed her escape from inferior protrusion entirely to the loss of the six-year molars in the lower jaw. They were not lost in the upper.

THE PRESIDENT said that in Mr. Lockett's paper on extraction, he described the travelling back of the lower teeth resulting from the extraction of lower molars. Whether the occlusion would be improved in the case under discussion it would be difficult to say. It was possible there might be a travelling back of the incisors by removing the first lower molars.

MR. HEDLEY VISICK thought the cutting of the bite was the most feasible thing. With regard to taking out the six-year-old molars, it seemed to him at the age of fifteen there would be little hope of much success and, besides, the inter-dental spaces were most marked in the incisor region, and therefore it would be thought that if the teeth were going to travel back they would do so in the incisor region without the molars being extracted.

MR. J. H. BADCOCK mentioned the case of a small boy who was brought to him by his mother, not because she thought there was anything the matter with him, but being careful of her children's teeth, she thought the child's mouth might be examined to see that they were all right. The teeth were quite sound, but the mandibular teeth bit entirely inside those of the maxilla, with the slight exception that they met just a little on the second molar of one side, though even then the lower molar was inside the upper. It was quite obvious that the child could not masticate his food. On enquiry, he found that the child, who was four years old, was very delicate and made a great fuss about eating, always complaining of lumps going down his throat and hurting him. The upper arch was very wide, the lower arch fitting entirely inside of it, and owing to the occlusion, the upper teeth had been forced out laterally and the lower teeth forced a little in. The upper incisors were all very much behind their normal position, owing probably to the action of the upper lip and their having no support from the lower incisors. He first of all put a plate into the upper jaw, which plate he carried inwards over the lower molar teeth, so



as to give the child something to bite upon. Cribbs on the first molar on either side retained the plate, and there was an arrangement to push forward the upper incisors, as it was found quite impossible to put the jaws in normal occlusion. The result on the general health of the boy was very marked indeed. Later on a split plate with a screw was made. There was a thin arch of wire going behind the upper incisors, and as the two halves of the plate were drawn together, this was bulged and so pressure put on the upper incisors. In the lower jaw a plate was fixed, consisting of a springy wire going round inside the arch, with two little cribbs attaching it to the first molars, in order to expand the lower jaw. The first plate had a screw in the anterior part of the arch, which enabled the nurse to expand the arch gradually, but eventually the screw proved a nuisance, and he trusted to the spring only. After two years, seeing the boy only occasionally, the condition had very greatly improved. The boy had lost his two lower incisors from natural causes, and it was now possible to put his jaws in normal occlusion. Bands were now being put on the second molars. In the beginning an attempt was made to put Angle bands on to the molars and use a fixed apparatus, but it was quite out of the question. The six-year old molars had not yet erupted, and his idea was that if the jaws could be brought into their proper relative positions before the eruption of those teeth, so that the teeth would interlock naturally as they came down, it would be a very desirable thing to do. He wished to hear something with regard to the feasibility of such a proceeding, whether the case had been undertaken at too early an age, and whether he should have contented himself merely with improving the masticating power. Originally he consulted Mr. Northcroft, who suggested the prompt removal of the four upper incisors as being a method of bringing the jaws into correct relations. The advice, he felt, was excellent, but as the patient was a pretty boy and the pride of his mother, he was not strong enough to carry it out.

Mr. Badcock also brought forward slides illustrating a case reported some years ago to the Odontological Society, with some further facts revealed since. The first slide showed the model of a perfectly healthy child, with excellently developed arches, nothing being the matter except that the upper teeth on the right side were in lingual occlusion. He could see no reason for it, but eventually found that at night the child was in the habit of putting her tongue into her cheek on the right side and sucking it, thereby thrusting out the lower teeth and pushing in the upper ones. In the course of conversation, a point came out which was most interesting, namely, that when the child sucked her tongue, she always fumbled a blanket. The blanket eventually wore out, and a piece was kept for her to fumble, and when in bed she fumbled with her hand while sucking the tongue, the two actions being strictly correlated. After the "woolly," as the child called it, was taken away, she never sucked her tongue again. Since then he had been in the habit of enquiring in cases of thumb sucking or other sucking, whether there was any correlated habit, and he had come to the conclusion that it was the rule rather than the

exception. He had many notes, but had only brought along some half-a-dozen, as follows :—

Boy, aged ten, thumb sucking habit, early. Brother sucked thumb until he was sixteen, and fumbled with a cap at the same time. Sister also sucked thumb, fumbled a blanket.

A small girl uses "comforter" nightly, fumbles her clothing with the left hand. Fumbling ceases when sucking stops.

Girl up to the age of five had the habit of sucking her thumb and at the same time playing with a piece of flannel with the other hand. Sister sucked her thumb, but did not do anything else.

Girl aged fifteen sucked the right thumb up till quite recently, and at the same time rubbed her nose with the right forefinger and rubbed together the forefinger and thumb of the left hand.

Lady, between forty and fifty, still sucks her thumb with a great noise at times, and always rubs her hair at the same time with her left hand.

Small boy sucked his fingers. Whenever he put his hand on the fur of the dog, his other finger immediately went into his mouth.

That, Mr. Badcock thought, was a curious and striking list of cases. He believed that Darwin, in "The Expression of the Emotions," explained the habit of a cat of gently lifting its paws up and down when pleased as a relic of the time when it pressed its mother's breast to express the milk, the action connected with the first pleasurable sensation it ever experienced having become correlated to pleasurable sensations in general. Was it not possible that the same explanation could be given with regard to the habit of fumbling something woolly or hairy at the time of sucking? Might it not refer to a simian ancestry?

The PRESIDENT heartily congratulated Mr. Badcock upon the ingenuity he had displayed in treating the case he first mentioned. He had not quite gathered whether the condition shown in the last models was one of normal occlusion or whether the jaws still remained post-normal.

MR. BADCOCK said the jaw was still post-normal, but the models could now be placed together in normal occlusion, and that was the reason he had now applied reciprocal traction.

The PRESIDENT said he had never attempted to put reciprocal traction on temporary teeth. The earliest case on record of the application of reciprocal traction was that quoted by Dr. Mendel in 1905, of a boy of four, in the seventh edition of Angle's book. He thought the crux of all cases that were treated so early was how long the case was to be retained. He thought in Mr. Badcock's case if the first permanent molars could be induced to lock normally under the influence of reciprocal traction the period need not be so long, although personally he should be extremely cautious in taking the retainers off.

With regard to the other case, he thought it opened a wide field for speculation. He considered the suggestion of the children harking back to a simian ancestry was a very plausible explanation.

MR. THOMPSON asked whether Mr. Badcock had any theory of the cause of the first case. With regard to the second case, he believed Darwin said the habit was not only correlated, but inherited.



MR. ROWLETT asked if Mr. Badcock had been able to discover whether the children were breast fed or hand fed, because the bottle certainly had nothing very hairy or woolly about it. He thought it might possibly arise from the woolly nature of the mother's clothing pressing against the child.

MR. M. HOPSON asked Mr. Badcock if he had paid any attention to the size of the tongue of the child in the first case. If the child had an exceedingly small tongue it might have accounted in some way for the extreme smallness which existed in the lower jaw. He remembered a case in which all the molars on the right side of the lower jaw were in lingual occlusion. The boy had had diphtheria when quite young and there was evidently some arrest of development on that side of the face in the mandible. The child had been weakly all along, but he imagined that Mr. Badcock attributed the weakness of the child he mentioned rather to the fact that he had been unable to masticate his food properly. With regard to correlated habits, he had no doubt that most members had noticed that in typical cases of thumb sucking the nose was frequently deflected to one side or the other; that was not a correlated habit, but a direct result of the habit, the deflection being caused by the pressure of the first finger on the side of the nose.

MR. BADCOCK, in reply, said he was utterly in the dark with regard to the cause of the first case. The father had post-normal occlusion, the teeth pointing rather backwards, and there was a very considerable overbite. The child was in every way a healthy child, except for its indigestion, and as soon as that was put right he was quite normal. There was no mouth breathing or anything of the sort. Whether breast fed or hand fed he had forgotten. With regard to Mr. Rowlett's remarks, he thought that probably the race memory went back further than feeding bottles and clothes.

MR. HOPSON showed a series of models illustrating the mouths of some children very nearly related. The first model was that of a boy aged twelve, who had only two teeth in his lower jaw, a molar and a canine, while in the upper jaw he had three or four teeth which might be regarded as incisors, with one six-year-old molar on each side. The X-rays showed there were no other teeth to come. The boy had sandy hair, blue eyes, and practically no nails. The second models were taken from the mouth of a brother, aged ten, who presented very similar conditions. In another brother, aged ten months, there were only two little cone-like teeth, widely separated. The boy of ten had dwarf nails, blue eyes, and sandy hair. Three other models showed the mouths of three girls cousins of the last children, showing in two instances similar conditions, the mouth of the third child being normal. An interesting point was that the relationship of the children were very close, as the fathers were brothers and the mothers sisters. Unfortunately he had been unable to follow up the history.

THE PRESIDENT thought it was extraordinary to see cases with such marked lack of teeth, and it was wonderful the children had thrived so well. He thought it was disappointing very often to find peg-shaped laterals appear where one expected a full-sized tooth. The case also brought out the value of X-rays.

MR. THEW said that not long ago he had seen a girl, aged fifteen, who had all her teeth present, with the exception of a first temporary molar retained on the right hand side in the lower jaw. The tooth being in a carious condition it was removed, and the space held for the permanent tooth to come in. As no teeth appeared an X-ray photograph was taken, and showed nothing at all.

THE PRESIDENT said in speculating on the hereditary point of view it was interesting to speculate whether it was an acquired characteristic from the first progenitor.

MR. BADCOCK said he had amongst his own patients an interesting series of deficient dentition. The laterals and other teeth were deficient in various members of the family, and the same state of things occurred amongst several of the cousins, and in several generations.

MR. HOPSON did not doubt that the condition must have arisen from a germ variation, and was not an acquired characteristic. The subject was one that was of some interest, and might be of practical importance, and he was endeavouring to collect some material which he hoped during the coming winter to present to the Society.

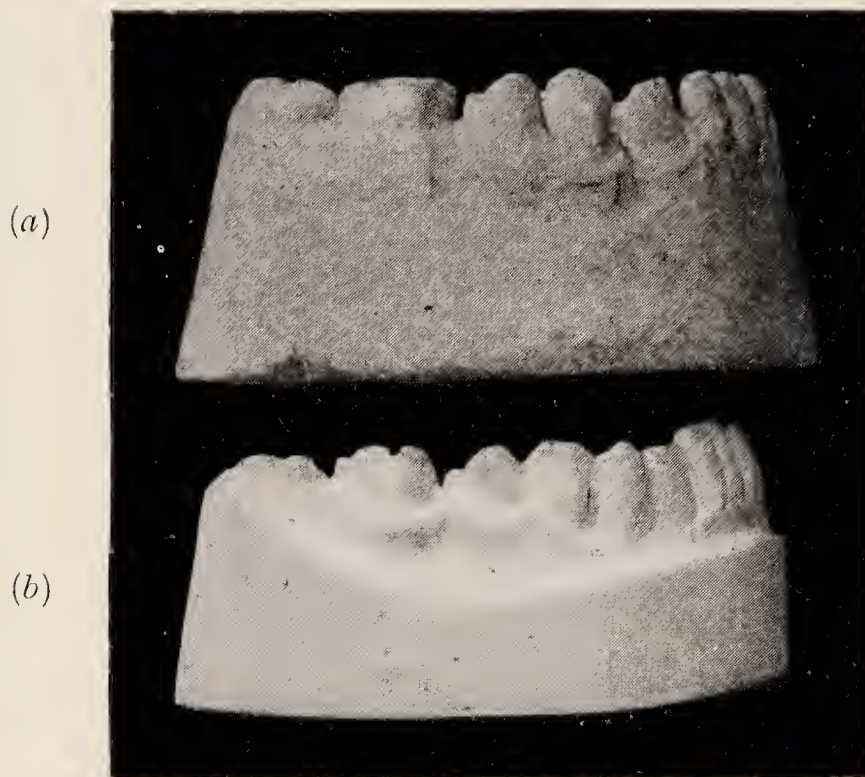
THE PRESIDENT exhibited a slide illustrating a rare condition of a supernumerary temporary tooth, which before it erupted he thought would be a supernumerary lateral. The first model was taken at the age of  $2\frac{1}{4}$ , and the second at the age of 2 years and 5 months, and the third at the age of  $2\frac{1}{2}$ . At age 3 he removed the supernumerary tooth, which proved to be a well formed temporary canine. The X-ray picture was interesting as being one taken from the living subject. It was also interesting because, although in the model the canine tooth was turned through a quarter of a circle and the distal surface of the tooth was pointing outwards, in the skiagram it seemed in a perfectly normal condition, and that showed how cautious one should be in reading radiograms. Another point shown by the photograph was that the temporary lateral root was completely formed and the permanent lateral was lying below the apex of the temporary lateral. Absorption had not yet started, and it looked as if the absorbent organ did not come directly down on the top of the root, and as if that particular tooth would be absorbed away from the back forwards.

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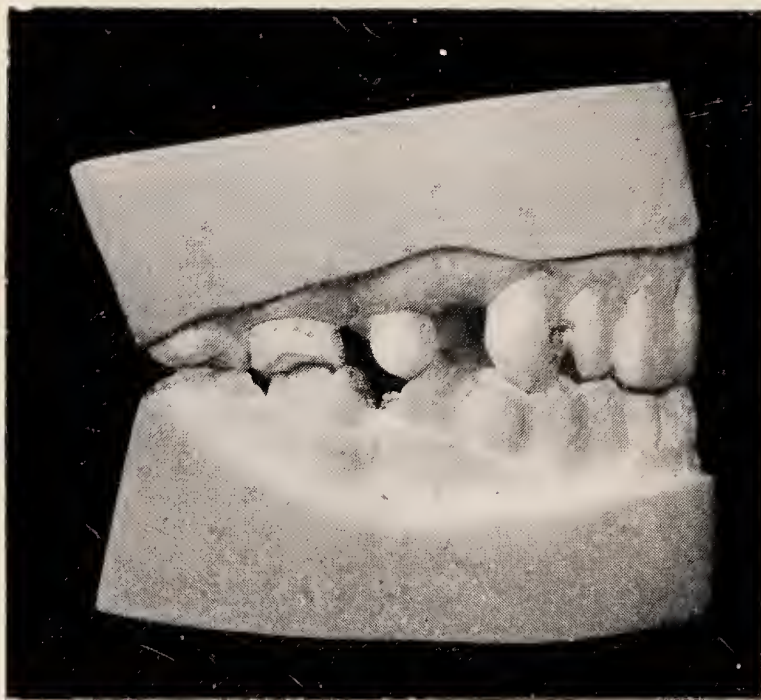


FIG. 1.



Models showing case after extraction of canine (a)  
and its replacement by a bridge. (b).

FIG. 2.



Shows model of finished case in occlusion.

(Note.—Blocks show the right side to have been treated, whereas the left  
was the side operated on.)



## ORDINARY MEETING.

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AN ordinary meeting was held on Wednesday, October 13th, 1909, at the Medical Society's Rooms, Chandos Street, W., MR. GEORGE NORTHCROFT, President, in the chair.

The minutes of the last meeting were read and confirmed.

### CASUAL COMMUNICATION BY MR. CHAPMAN.

The casual communication which I bring before you this evening is intended to exemplify a mode of retention as much as the treatment of an irregularity. The patient is a student at Guy's Hospital; some years previously he had the misfortune to lose the left lower canine, with the result that the lateral moved distally; tipping at the same time so as to occupy nearly all the space. The two centrals, which are crowned, also moved to the left, but very slightly in comparison. This condition was exceedingly displeasing to the patient, who, in spite of advice to the contrary, asked that it should be corrected. The result is shown in the accompanying reproductions, the first representing the lower jaw both before and after treatment, whilst the second shows the occlusion which was not appreciably altered. The necessary movement was obtained by means of the arch, the medium for anchorage being clamp bands on the first molars. The incisors were all moved to the right by means of ligatures passing round the teeth and round spurs soldered to the arch, one a little to the right of each tooth to be moved. This movement was increased by turning the nut on the left side of the arch hard against the tube on the clamp band, that on the right side being turned away from the tube. An attempt was made to move the two bicuspid distally, as there was, and still is, a slight space between the second bicuspid and first molar. From what has been said, it will have been guessed that success did not attend the efforts in that direction, undoubtedly because they were not sufficiently persevered with. The left lateral was also rotated by means of ligatures acting on a spur soldered to the mesio-lingual angle of a plain band. Before commencing treatment a filling in the lateral was removed; this tooth was then devitalised and the canal enlarged. A gold inlay was made for the cavity, carrying a tube, which fitted the

enlarged canal; into this tube a piece of split flat gold wire had been fitted previously. A gold filling was inserted in a mesio-occlusal cavity made for the purpose in the first lower bicuspid. A pit was drilled in this filling to carry a spur.

The necessary movement having been accomplished, the inlay was put in place in the lateral, a plaster impression of it and the first bicuspid was taken, and a removable bridge made, which makes an admirable retaining apparatus, not only because it is a permanency, in so far as such a term may be used in dentistry, but also because it replaces with an artificial substitute the lost organ, with no inconvenience to the patient. Tooth movement occupied less than six months.

The PRESIDENT thought the case was a very interesting one, as showing what a large space could be obtained in the mouth, large enough to insert a canine tooth and yet keep the bite good.

The following paper was then read:—

## THE RELATIONS OF DENTISTRY AND OTO-LARYNGOLOGY.

BY DAN MCKENZIE, M.D.GLAS., F.R.C.S.EDIN.,

*Assistant Surgeon Central London Throat and Ear Hospital.*

DURING the last four or five years we have witnessed and welcomed the birth of an *entente cordiale* between several specialities. We, in the nose and throat, have as our neighbours, on the one side, the ophthalmologists, and on the other the dentists. For long we all had lived, each within his own borders, like hermit nations, but recent days beheld a levelling of ancient barriers and a consequent free exchange of ideas and information, which already have proved to be productive of benefit.

In the frontier between the eye and the nose you cannot be expected to take much interest, but it is proper, nevertheless, that I should draw your attention to recent developments in this field of work. As a result of the painstaking researches of Onodi, lesions of the nasal sinuses are now looked for, as a matter of routine, in cases of optic neuritis and orbital cellulitis.

I wish it could be said that the state of the mouth and teeth was always investigated in nasal and pharyngeal disease. That most of us are aware of the close pathological connection between the two regions is undoubted, but that in all cases of nasal and pharyngeal disorder a careful examination of the mouth and teeth is made, cannot be truthfully affirmed. We overlook, or forget, the necessity. In like manner, I think it is the case, you will correct me if I am wrong, that dentists confine their interest and their attention too strictly to the teeth and buccal cavity.

The object of this paper is to advertise the advantages of a wider outlook for us both, and when I have detailed the clinical experiences upon which I rest my appeal, I think you will agree with me that a wide purview is for all specialists a mental attitude of great value, both to our patients and to ourselves.

To begin with, let me allude to the close and intimate association which exists between dental irregularity and nasal incompetence.

As you know, the deficiency in space that results from the deformity of the upper jaw known as the contracted, or Gothic palate,



produces crowding and irregularity of the teeth, conditions which are a fruitful source of dental caries and general ill-health even in young people. Sometimes, as a result of the length of the anterior border of the alveolar process of the upper jaw and the protrusion of the upper incisors, sometimes as a result of a mis-shapen lower jaw and misplaced eruption of lower molars, the mouth cannot be closed, nor the lips brought together, and the constantly open mouth not only favours the continuance of mouth-breathing, when it is already present as a result of nasal obstruction, but also, perhaps, independent of nasal obstruction, may even originate this harmful and objectionable habit. Now it has long been held—indeed, ever since Meyer of Copenhagen first drew attention to adenoids—that nasal obstruction during the growing period, with the consequent open mouth, is responsible for the contracted palate. This opinion has been widely prevalent for many years, and still commands the sympathy of most people. But there has been, and still is, considerable divergence of view as to the mechanism which engineers the palatal deformity. The conflicting opinions on the matter are as follows :—

The first I shall deal with may be formulated thus: that the deformity of the palate is due to the compression exercised by the facial muscles, and soft parts generally, upon the alveolar border of the maxilla, in response to which the palate is narrowed from side to side, while the pre-maxillary segment, with the teeth it bears, is pushed forward in the direction of least resistance.

One of the objections sometimes raised to this theory of production is, as your dental experience tells you, scarcely worthy of consideration. It is that a slight pressure, such as may be exercised by the cheek, is insufficient to alter the disposition of the growing bone and teeth. But the art of regulation, dependent as it is upon the slow action of continuous gentle pressure, has demonstrated that by this process teeth can be shifted from one position to another as certainly as by a blow from a pugilist. And, with regard to the shape of bone itself, modern pathology has taught us that bone is a highly plastic living tissue, yielding to some forces, or becoming strengthened to resist other forces, according to varying circumstances. We know, for example, that the vault of the cranium is flattened by the carrying of weights upon the head; and it is even said that the “weight of Time” has precisely the same effect upon the skull. We know, also, that the knock-knee, flat-foot, and lateral spinal curvature of adolescence are due to the habitual adoption of faulty attitudes in weedy and overgrown boys and girls. It may be objected, however, that the forces producing these deformities are much more powerful than the light pressure of the cheek. But even light pressure will alter the configuration of bone. There is a tribe of savages on one of the islands of the East Indian Archipelagoes among whom a conical skull is regarded as the hall-mark of gentle breeding. The desired shape is obtained during early infancy by the mother constantly and assiduously massaging the skull with her fingers.

Thus if a pressure, or drag, on the upper jaw does exist in mouth-breathers, the probability is that it could alter the alveolar process

in such wise as to produce the deformity we are now considering. But, does this force exist? And if it exists is it the sole agent in the causation? Now it must be admitted that the drag or pressure upon the bone by the soft parts, when the mouth is open for breathing, must be extremely light. Indeed, the very existence of this pressure may be questioned, for, in order to enable a child to breathe, the mouth need be opened but a very little way, and in this position the soft parts scarcely compress the upper jaw at all. The tension of the muscles, also, must be very slight, if only because the facial muscles are not attached to bone. Indeed, it is perfectly plain that the lateral pressure exercised in open-mouthed conditions must be enormously less than that exercised by atmospheric pressure when a baby is sucking its mother's nipple. So that if this lateral pressure from without were the sole cause of the deformity, every child and every individual on earth would possess a Gothic palate. Obviously, therefore, there must be some other agent in the causation. Finally, the quietus is administered to this venerable theory, as the sole and invariable cause at all events, by the well-attested fact that the Gothic palate is found in people who have never been mouth-breathers.

Thus we are driven to seek further afield for an explanation of the deformity. And we pass now to consider the ingenious and well-detailed theory promulgated by a distinguished member of your Society, Dr. Sim Wallace.

Dr. Wallace, if I understand him correctly, holds that the normal shape of the adult superior maxilla is the expression of a resultant of several forces, the absence or relative deficiency of any one of which will mean deformity. And, while the pressure of the soft parts we have just been considering may, in his opinion, occasionally influence the final shape of the palate, the preponderant factor lies within the mouth, and depends upon the size and shape of the tongue. If the eccentric pressure of a well-formed tongue does expand the upper jaw, mouth-breathing will, of course, remove this expansile force, even if the mouth is opened but a very little, and so the jaw, this force being absent, will develop in what may be termed a haphazard method. It is here that I feel some hesitation in accepting the tongue theory, pure and simple. Is it proved that a negative factor is sufficient to determine a definite malformation? To my mind, the agent would seem more potent in causation if it were a positive factor.

Dr. Wallace meets the difficulty of the occurrence of the Gothic palate in nose-breathers by assuming that in these cases the tongue is abnormally small. Now, it is known that macro-glossia is often combined with a widening of the jaws, but I am not aware whether a statistical investigation of the relationship between the size of the tongue and the shape of the palate has, or has not, been made.

It may be said, however, that the contracted palate in mouth-breathers is produced by a combination of the slight positive pressure of the cheeks and the absence of the normal lingual opposition to this pressure. And I am bound to admit that, in combination, these factors strike me as much more powerful agents than either one of them apart. But, withal, I do not feel myself, so far,



convinced that there is such a thing as pressure from the cheeks in ordinary mouth-breathing.

Another theory of causation of the narrow palate was published just three years ago by Dr. Pedley, of Rangoon. According to this observer, the narrow palate is a consequence of improper suction by the infant in the use of the rubber-teat. Dr. Pedley provides us with a large number of what seem to be extremely plausible arguments to show why the rubber-teat might be expected to produce the Gothic palate. Unfortunately he does not furnish figures in support of his attractive theories, and so I took upon myself the duty of doing so, examining for the purpose 222 cases in the Central London Throat and Ear Hospital. My analysis, which was conducted with every care, did not, however, give any decided support to Pedley's teaching.

I found, for example, in children who had never used a rubber-teat that 54·7% had "high" palates and 19·2% the extreme or Gothic palate; while of those who used the rubber-teat 58·4% had "high" and 32·1% Gothic palates. A difference, that is to say, of only 4% and 13%; by no means sufficient to entitle us to claim support for Pedley's theory from these figures. (The term "high" is used in the relative sense.)

Further, the figures showed that in breast-fed children 56% had healthy teeth, and in children who had used the rubber teat, 49% had healthy teeth. Again a difference too slight to have any meaning.

Thus Pedley's impeachment of the rubber teat is "not proven."

We now leave on one side the mechanical explanations, and proceed to discuss two other theories.

First, we may take the hypothesis that the Gothic palate is a developmental defect, conditioned when the bed-plates of the organism are laid down, long before nipples of any kind come into use. It has been suggested that the Gothic palate is a defect due to an exaggeration of the dolicocephalic, or the antero-posteriorly long skull of the Aryan race. In favour of this explanation, we have the significant fact that the Gothic palate is not an isolated deformity, but only one of a group. The others are:—A narrowing of the nasal chambers, sharpness and thinness of the nose, approximation of the nasal bones, deviation of the nasal septum, and, it is said, I am not aware upon what authority, a side-to-side flattening of the whole skull. The result is the physiognomy to which I have applied the title of *the rodent face*. On the Continent, they look upon the rodent face as the typical English countenance, as you will see from their comic journals, while in England I have a suspicion that we associate such teeth and long sharp noses with high breeding and hauteur. The idea of high breeding is not entirely grotesque, for the developmental theory of the contracted palate does not run counter to Weissmannism, seeing that the rodent face may be looked upon as the climax of fine breeding, like some of the "points" in a fancy class of dogs or pigeons.

These people sometimes suffer from adenoids, but the removal of the adenoids and the regulation of the teeth fails, in some cases,

to cure their mouth-breathing because their nasal passages are too small to permit of free respiration through the nose.

The great advantage of the developmental theory of deformed palate is that it cannot be easily attacked; its great drawback, that it merely ignores and does not account for the genesis of the deformity. Besides it must not be forgotten that nasal obstruction, by adenoids or otherwise, during the growing period, is often followed by the appearance of the rodent face at puberty.

One might imagine, with all these explanations to choose from, that there could be no room for anything new. But such is not the case. Within the last few years, Dr. Leonard Williams has produced a new theory. Dr. Williams found that nocturnal incontinence affecting children who were the subjects of adenoids, was sometimes not cured by removing the adenoids. He administered thyroid extract to these patients and the incontinence stopped. Therefore, he says, deficient thyroid secretion is responsible, not only for nocturnal incontinence, but also for adenoids, the contracted palate, and the whole bag of tricks. We are dealing, in short, with a modified cretinism. In cretinism, however, the tongue is large and the palate wide, so this theory may be handed over to Dr. Sim Wallace for his consideration.

Here, then, we reach the end of the arguments regarding the contracted palate. If you feel yourselves in a fog, I can heartily sympathise with you, for it is hard to know which way to turn. On the whole, however, that theory which assigns the contracted palate to a combination of deficient support on the inner side with excessive pressure on the outer side—if this pressure can be proved to exist—seems to be the least open to objection. At the same time, it is perhaps an error to ascribe all cases to the same cause.

Before leaving the subject, I should like to emphasise the fact that the adenoid face and the rodent face are two different conditions, separate and distinct from one another. They resemble each other to some extent, it is true, and this resemblance has led people to speak of them as if they were identical. The adenoid child often develops the rodent face as it grows older, if the adenoids are not removed. And in such cases the tendency to regard the adenoids as the cause of the facial deformity is almost irresistible. But it is also true that hundreds of children grow up with adenoids and never exhibit the rodent face; and, on the other hand, the deformity may be found in people who have never had adenoids, and have never been anything but nose-breathers in their infancy and childhood.

When all is said and done, however, the practical fact remains undisturbed that, in most cases of contracted palate, &c., the harmonious and intelligent co-operation of dentist and rhinologist is capable of effectually remedying the abnormalities, so as not only to improve the personal appearance of the patient, but also to elevate the general tone of his health.

We now take leave of the palate and its problems and proceed to deal with the other clinical facts I promised you.

Of recent years we have become quite accustomed to hear oral sepsis blamed for the occurrence of gastric and duodenal ulcers,



diarrhœa, and other derangements of the digestive system, among which, I suppose, we may include pernicious anæmia. But, by a curious anomaly, less is said about the influence of dental disease upon the regions immediately adjoining the buccal cavity, the pharynx, nose, ear, neck, &c. To this statement we must make one exception, namely, in the case of antrum suppuration, the frequent dependence of which upon a carious bicuspid or molar has long been recognised and acted upon.

If proof of the general statement is required, it can be found in the text-books of Oto-rhinology. Most of these books make no reference whatever to the influence of diseased teeth in the production of throat, nose, and ear complaints, while the minority (which seems to be made up wholly of very recent text-books) that do allude to it, give it by no means the prominence we might expect. On the other hand, in discussing the etiology of diseases of these regions, the hedges and highways of the constitution are ransacked with the most careful diligence, often with very interesting and important results. But the mouth, the cavity through which we conduct our examination, and above all, the teeth, we too often ignore, simply, I suppose, because it is the dentist's business to look after the teeth, and so their condition does not interest us. Unfortunately, disease pays no regard to our artificial boundaries.

It is well-known that the mouth, of all the body-cavities, possesses the richest and most varied bacterial population, and that, when the teeth are the seat of caries or pyorrhœa, the bacteria present are of a pathogenic character.

With reference to the bacterial contents of the mouth, I am not qualified to speak with special authority. But it is common knowledge that in addition to definitely non-pathogenic organisms we frequently find strepto and staphylococci, the pneumococcus, sometimes the diphtheria bacillus and others, any one of which may set up disease in the pharynx, naso-pharynx, ear and nose, if the general or local resistance is lowered. Occupying a position between the definitely non-pathogenic and pathogenic organisms, there is a third variety, represented in the mouth by the *spirochaeta dentium*, the pathogenicity of which is not yet absolutely settled.

Here, then, we have a complex and variegated collection of potentially virulent material, quite sufficient to account for the readiness with which bites becomes septic.

I should like to direct your attention for a space to the *spirochaeta dentium*, since it has quite recently formed the subject of a series of investigations by Dr. Wyatt Wingrave in the Pathological Laboratory of the Central London Throat and Ear Hospital. This organism is a spirillum of varying length, the spiral turns of which, after the organism is dead, appear longer and more whip-lash-like than the regular corkscrew turns of the *spirochaeta pallida* of syphilis. The organism is found in two forms, the spiral and bacillary. When alive it is freely motile showing great activity when viewed on the darkened stage; and during life its spirals are more regular than after it has died. It is a normal inhabitant of the buccal cavity and oro-pharynx. Yet it is a delicate organism and is easily killed.

Whether or not the *spirochaeta dentium* ever becomes pathogenic is a question not yet settled, but, in view of certain facts, for which we are indebted to Wingrave, and which I am about to detail to you, there is no doubt that it should be viewed with suspicion, particularly when it is found elsewhere than in the secretions, or on the mucous surface, of the buccal cavity.

The spirochaete seems to have been first described by Vincent, of Copenhagen, who, finding it in the secretions of a variety of pharyngeal ulcer, looked upon it as specific to this lesion. But later observers having discovered it in the mouths of healthy people are inclined to doubt whether it should be so regarded. We shall recur to this point later.

There is a disease of the teeth and gums with which we are all familiar, namely, *pyorrhœa alveolaris*, the causation of which has been ascribed to several different organisms, the spirochaete among them. This disease, particularly when extensive, is, I am convinced from clinical experience, a fruitful source of tonsillar and pharyngeal infections, at all events it is a frequent accompaniment of them. These infections assume many forms, from superficial ulceration to extensive and dangerous cellulitis, and there can be no doubt that oral sepsis is a most important factor in their production. In acute pharyngeal infections, Wingrave is convinced that the spirochaetae are much more numerous than in the normal mouth and pharynx, and he has been able to obtain them by needling from the tissues underlying pharyngeal ulcers. Consequently, in people who are subject to pharyngitis, tonsillitis, quinsies and so on, not only should the pharynx receive appropriate treatment, but the dentist should be called upon to render the mouth healthy.

This brings me to consider the necessity for the care of the mouth and teeth before operating on the pharynx and naso-pharynx. It seems strange at this time of day that we should consider it necessary to draw attention to a disregard of surgical cleanliness in performing any operation. And it is still more strange that our complaint should apply to an operation like that for the removal of tonsils and adenoids, of which thousands are performed every day.

The sterilizing of the surgeon's hands and instruments, in the performance of this operation, is undertaken with the most scrupulous care; the patient is duly purged and dieted; and the operating-room is beyond reproach. Everything, in short, is perfectly clean—save the cavity through which we operate. I am bound to admit, however, that my strictures only apply to minor operations. In major operations, such as the removal of the tongue, thyrotomy, laryngotomy, &c., care is always taken to clean the mouth as thoroughly as possible before the operation is begun. In other words, it is obvious that most surgeons do not think it worth their while to have the mouth rendered wholesome before removing tonsils and adenoids. These cases, we are told, always do well without special attention being paid to the state of the mouth. But this off-hand statement is not founded upon fact. A few years ago, I had the opportunity of watching the convalescence of rather more than 100 children belonging to an institution, while



they were being operated on for the removal of tonsils and adenoids, in whom the mouth received no attention whatever in the pre-operative treatment. Of these cases, rather more than one-third showed a rise of temperature on or about the third day. In most, the pyrexia was quite moderate and lasted only a day or two. In several, however, it rose to  $103^{\circ}$  or  $104^{\circ}$  F. and continued so for from three days to a fortnight. That the fever was due to septicaemia was proved from the signs of local infection present: the pharynx became red and swollen, the breath was foetid, there was a copious nasal muco-purulent discharge, and the cervical glands became enlarged and tender.

To this sort of infection we owe the occasional occurrence of acute suppuration of the middle ear after the operation, a complication I have known to end in serious intra-cranial disease.

In addition to these cases, I have seen one fatality from sepsis following the removal of tonsils in an adult with pyorrhœa. In this patient, gangrenous pharyngitis set in about a week after the operation, and caused severe secondary hæmorrhage. The bleeding was controlled, but the pyrexia continued, and the patient died from septic intoxication six weeks after operation.

Further, I recently performed the operation on a patient with dental caries and pyorrhœa. Before operating, I followed what is now my invariable rule in such cases, and sent him to his dentist to have his mouth put right. But he was pressed for time, and, in spite of my warnings, determined to have his operation sooner than was deemed advisable. So I prepared for trouble by giving him antistreptococcus injections and anti-septic mouth-washes during his convalescence. He left the nursing-home a week after his operation and went into the country. There he had a severe and prolonged attack of septic pharyngitis with temperatures running up to  $104^{\circ}$  and  $105^{\circ}$ . He recovered, however, and attributed his illness to bad drains.

These facts and figures prove beyond a shadow of doubt that this slight and simple operation can be dangerous to life unless we exercise proper care in rendering the mouth as clean as possible before operating. I now have carious teeth removed, pyorrhœa treated, and give the patient an antiseptic mouth-wash to use during the week before operation, and the result has shown that my opinion is correct that the mouth and teeth are the source of this local and general sepsis. The patients have now no rise of temperature; there is no pharyngitis; no foetid breath; and middle-ear suppuration consequent upon the operation, seems to have disappeared since this simple method of prophylaxis was begun.

I do not know a single text-book where this necessity of treating caries and pyorrhœa, before the tonsil-adenoid operation, is even mentioned, still less insisted upon.

We turn now to the nose.

There is no need to dwell upon dental infection of the antrum, for its frequency and importance are well-known. But perhaps I may mention that drainage of the antrum through an alveolar puncture should be avoided. When the suppuration is caused by a carious tooth, the tooth should be removed, of course; but the

antrum should be opened and drained by a large hole made into it through the nose. If the cavity is drained by an alveolar opening into the mouth, the pus flowing into the mouth may infect the gums, and, mixing with the food, will expose the patient to the risks of intestinal sepsis. If, on the other hand, a plug is inserted into the alveolar opening to alleviate these difficulties, then the antrum is not drained.

In general purulent rhinitis, also, the mouth should be made clean ; and the same rule applies to operations upon the nose, especially when some structural repair is being effected, and the nasal cavity is aseptic to begin with.

Turning to the ear, we know that aural suppuration is due, in the first instance, to the micro-organisms of pneumonia, influenza, or acute catarrh, and that, after perforation of the drum-membrane, the disease is kept going by staphylococci, streptococci, and so on. In addition to these organisms, Wingrave has demonstrated the presence of spirochaetes in a certain number of cases, and it has been observed that when the aural discharge exhales a sweetish "toothy" odour, the pathological examination reveals these organisms. It is interesting, also, to note that in the contents of cerebral abscess, secondary to middle-ear disease, Wingrave has been able, at times, to demonstrate the spirochaete.

There is one more result of infection from the mouth or teeth in which dentist and surgeon have an equal responsibility. That is, in chronic enlargement of the cervical lymphatic glands. Two or three years ago I instituted an enquiry into the state of the cervical glands in throat complaints with the result that it was found that in practically all cases of enlarged or fissured tonsils these glands were enlarged, and, in like manner, that carious teeth also were frequently associated with glandular hypertrophy. Therefore, before submitting a patient to the severe ordeal of removal of glands by dissection, all possible foci of infection should be sought for and removed. The wisdom of attending to this rule is well illustrated by the following case :—

Some time ago I was consulted by a patient who had been operated upon by a leading London surgeon for the removal of enlarged cervical glands on the left side of the neck. There was a recurrence six months later, and he was, naturally, very discouraged and depressed by his unfortunate experience. On examination of the mouth and throat the left tonsil was seen to be deeply fissured, and a lower molar on the same side badly decayed. Both of these open doors were closed by appropriate treatment, and the glandular enlargement disappeared without any further trouble. But this step should have been taken before the first operation.

The last case I will trouble you with was one I saw several years ago, when I was in general practice. A man, aged 53, developed urticaria, bronchitis, and pyrexia. Struck by the obvious presence of general septicaemia I sought for some toxic focus. Nothing was found save advanced pyorrhoea, affecting all his 15 teeth. The patient refused to have his teeth extracted. The symptoms then continued for several weeks, and during this period paroxysmal cough, with profuse expectoration, set in. From the start of the



illness a peculiar sweet "toothy" odour was perceptible in the patient's breath, particularly when he was coughing, and as time went on it became very offensive. The same factor clung about the sputum. No improvement in the condition occurred until 22 days after the commencement of the illness, when four of the worst teeth were removed; a week later the remainder were extracted, and the cough, expectoration, fever, and urticaria, all disappeared. There is no doubt but that the bronchitis was initiated and kept up by a continued supply of infective material from the mouth; and the "toothy" odour leads one to suppose that the offending microbe was the spirochaete.

We have now shown that in the mouth itself, in the pharynx, nose, ear, neck and bronchi, dental infection is responsible for many serious disorders. For this reason, therefore, dental surgeons must realise that they are responsible not merely for the state of the teeth, but also for the health of the individual. Incalculable harm is done by those who regard their work as purely mechanical; as, for example, when a plate is fitted over septic stumps. It is to be hoped that the time when such mal-praxis is permissible will soon pass away.

From our side of the frontier I can assure you that, although dentists have long been working in a position irrationally isolated from that of other practitioners of the healing art, yet the day has now dawned when your many years of labour are about to bear fruit in the awakening of your brethren to the importance of the teeth as an avenue for the invasion of the organism by disease, an avenue we had hitherto overlooked or had deemed of no account.

#### DISCUSSION.

The PRESIDENT said it was difficult to do more than thank Dr. McKenzie for his very interesting paper. He had struck one note to which the members of the Society should be very ready to respond, namely, the necessity of great breadth of outlook in dental work and the necessity for a fair knowledge of all branches of medicine. The portion of the paper which no doubt appealed to the members in particular was the first part in which Dr. McKenzie referred to the deformities of the palate. The members of the society were mainly concerned with that subject, and took especial interest in the possibility of remedying these defects. The remark made by Dr. McKenzie with regard to bone being considered a highly plastic living tissue was of great importance, as it explained how it was possible to move the bones of the palate, or to bend bones, without necessarily getting interstitial growth of bone.

DR. SIM WALLACE was sorry he could not criticise the paper, as Dr. McKenzie had shown a very thorough knowledge of the subject, even of that part of it with which the members of this society were specially well acquainted. The paper had also been made very fascinating and humorous, so that in following it, it had been difficult to make mental notes of possible criticisms. There were one or two points, however, that might be susceptible of a different explanation. He did not know exactly what Dr. Mc-

Kenzie's explanation was of the hereditary "rodent face" of the upper classes, but it seemed to him that seeing he (Dr. McKenzie) had pointed out what dentists should know and what place the dentist should take in the general scheme of medicine, he himself would like also to refer to what the doctors ought to know. He thought the "rodent face" was very largely due to the pap-feeding which doctors insisted upon. It was generally very thoroughly carried out among the higher classes, but not so thoroughly among the lower classes, who often gave their children a crust and let them gnaw away from pretty early infancy, thus allowing them to indulge in what perhaps was for their good. On the whole he thought the lower classes ate harder food, food that was not so much soaked in milk. Milk puddings were not always prepared for them; if there was a piece of bread about, it would be given them to chew. In England, therefore, he thought the difference in the type of face was not a difference due to heredity, but to some considerable difference in the way the children were brought up. With regard to the dolicocephaly which might have something to do with a narrow palate, he agreed that the condition might give rise to a rather narrower type of jaw, and consequent predisposition to nasal obstruction, yet, inasmuch as the head was longer, and assuming there was a corresponding length in the palate bones, there would also be a corresponding space for the regular arrangement of the teeth, so that there would not be that crowding which accompanied the pathological deformity generally associated with mouth breathing, which allowed a greater pressure to come on the teeth from the cheeks than from the tongue. He had been specially interested in Dr. McKenzie's remarks with regard to prophylactic treatment during operation, and he thought Dr. McKenzie's suggestions were very much to the point. He hoped to see Dr. McKenzie's remarks upon that subject, both in dental and medical journals, because they ought to be very widely known.

MR. W. RUSHTON expressed his appreciation of the paper and thanked Dr. McKenzie for reading it before the society. He understood Dr. McKenzie to say that the open mouth with the short lip caused mouth breathing, but that he thought was putting the cart before the horse. In his opinion it was the obstruction to the nasal breathing that caused open mouth. With regard to the rubber-teat being a factor, if it was a factor at all, it appeared to have been very much exaggerated. Clinical experience showed that, among children who had been brought up on bottles, provided their breathing was correct, the expansion of the jaw seemed to follow as a matter of course. He quite agreed with Dr. McKenzie that there was little or no difference in the soundness of the teeth of children who had been brought up on the bottle and those who had been brought up by Nature's method. With regard to the developmental theory, there might be something in it, but when one examined the dolicocephalic skulls in museums, if the skulls were of any antiquity, the jaw was thoroughly well developed and there was plenty of room for the teeth; therefore, he thought that was a point that might be very easily laboured too much. It seemed to him there was something in the theory of Dr. Leonard



Williams that there was some connection between adenoids and cretinism, and he should like to ask Dr. McKenzie whether there was also any relation between that and the *status lymphaticus*, because a short time ago a child who was operated upon for adenoids died under the anæsthetic, and at the inquest the cause of death was said to be that state. Dr. McKenzie said that a very usual cause of disturbance of the tonsils and the pharynx was pyorrhœa, and probably he was quite correct in so thinking, but he should like to know why such throat complaints were very common in infancy, when it was known as a matter of fact that pyorrhœa did not occur at very early ages. It might be a cause which existed later in life, but he had never seen a case of pyorrhœa in infancy, and he should like to hear whether anyone else had. With regard to the antrum, he could not help thinking that as a rule antrum cases had much better be turned over to the surgeon rather than for the dentist to attempt to treat it with the usual plate and plug. That had been his practice for many years, and he had never had any reason to regret it.

MR. PARRITT asked whether Dr. McKenzie had seen Mr. Lack's case, mentioned by Mr. Tilley last year, of a boy with unilateral facial paralysis. The boy had adenoids. On the side of the face which was paralysed the arch was splendid, but on the other side it was contracted. It, therefore, looked as if it were a case in which the muscles of the cheek had an effect in pressing the jaw inward.

DR. MCKENZIE, in reply, said he was very much indebted to the society for the extremely patient manner in which they had listened to one who was only too obviously an amateur in the work on which the members of the society were specialists and experts. But sometimes an amateur contrived to introduce, amidst a good deal of wild talk, a certain amount of fresh suggestion, and if he had done so he should be extremely pleased. The President had been very kind in his remarks, and he could only thank him and through him the society, for the honour conferred upon him in asking him to read a paper at the meeting. It was the very fact, as he had said at the beginning of his paper, that the palate formed the subject of the dentist's daily work, that made him resolve to extend the paper so that he should not look altogether too much of a sciolist. With regard to Dr. Wallace's remarks, in the paper it was said that the individuals who had the extreme dolicocephalic skull manifested a contracted palate. Mr. Rushton had also said that in dolicocephalic skulls in museums the palates were found perfectly well formed. But he was not dealing with those kinds of dolicocephalic skulls at all, but with extreme dolicocephalic skulls, and it was quite possible to have a very large collection of dolicocephalic skulls in a museum without a single specimen of the extreme type. It was possible there was such an extreme type. There were extreme types of all forms of development, and it was quite possible that the extreme dolicocephalic skull was a condition which was at times associated—he was not laying any stress on the theory at all—with the contracted and lofty palate. He thought Mr. Rushton must have misunderstood what was said, or perhaps it would be more correct

to say that he had not expressed himself in the paper sufficiently clearly, because it would be absurd to say that mouth breathing was due to the open mouth and not to the nasal obstruction. But he was quite convinced, and he was sure Mr. Rushton was aware of the fact, that even where the nasal obstruction was removed, the patient very often continued to be a mouth breather through habit or through the displacement of the teeth. If such irregularities and displacements were not rectified, it was possible, as he had said in the paper, that quite apart from any nasal obstruction at all, if there was an open mouth the patient would learn to breathe through the open mouth and ignore the passage through the nose altogether. Mr. Rushton thought there might perhaps be some connection between adenoids and cretinism. Any theory of that kind was extremely fascinating, but, having been born north of the Tweed, his slow and cautious brain was unable to take such fine leaps in hypotheses that some people could take. Although he admired the agility with which people overcame difficulties sometimes, he himself desired to have a few more facts before definitely considering an hypothesis to be any more than an hypothesis; he did not think it had yet attained to the dignity of a theory. With regard to the *status lymphaticus*, he frankly said that he did not know a single thing about it, and he should be extremely glad to hear from anybody who did. He had seen it quoted as a cause of death in many cases of death from anæsthesia, and he was bound to say that the word seemed to have supplied a long felt want. It was said to occur in adenoids. At the hospital with which he was connected, there were 4,000 cases of adenoids every year, and the record was one death in 30,000. Consequently it could not be a very fatal disorder under anæsthesia if the adenoid was due to *status lymphaticus*; but, as no one knew what it was, one could either say that it was or it was not. With reference to tonsilitis being more common in infancy, and accounting for it in the absence of pyorrhœa, he did not wish to leave the impression on the society that all tonsilitis was due to dental infection, because tonsils were very much enlarged and very much exposed to infection in children. In adult life tonsilitis was very frequently, but not invariably associated with dental disease. He wondered whether tonsilitis was more common in children or in adults. Certainly the chronic enlargement of the tonsil was undoubtedly immeasurably more common in children, but he questioned very much whether septic tonsilitis was more common in children. He was not, however, in a position to state, as he had not taken figures or seen figures dealing with the point. He thought tonsilitis was just as common in adult life as in infancy. He remembered reading about Dr. Lack's case of unilateral facial paralysis, and it seemed certainly to show that the pressure of the muscles of the cheeks was quite sufficient to cause the alteration in the shape of the bone. On the other hand, it was necessary to be extremely careful not to argue too much from one single case. Frequently, in the Societies odd cases were exhibited where all the conditions were present, the cases being shown because they did not exhibit any deformity whatever. He had frequently seen cases



shown with lesions or abnormalities, which ought to lead to certain deformities, but which were shown because they did not. Those negative cases did not make so much impression on the mind as positive cases, but their importance was great in arriving at a definite conclusion. Therefore, while he admitted the force of Dr. Lack's case, he should be inclined to advise caution until it was seen whether the case was repeated, and if repeated, whether it was repeated frequently.

The PRESIDENT, in the name of the society, formally thanked Dr. McKenzie for presenting his admirable paper.

The Society then adjourned to Wednesday, November 10th.

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## ORDINARY MEETING.

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AN ordinary meeting was held at the Medical Society's Rooms, Chandos Street, W., on November 10th, 1909. The President, MR. GEORGE NORTHCROFT, in the Chair.

The minutes of the previous meeting were read and confirmed.

Mr. J. McBride, L.D.S.Eng., was then elected a member of the Society.

The PRESIDENT, after welcoming visitors, said he would like to point out to the members that according to Bye Law 20, the nominations for officers and councillors are open to all members of the Society, and if any four properly qualified members wish to nominate any particular men, they will please do so by sending notice in writing to the Secretary at least 21 days before the Annual General Meeting which takes place on Wednesday, December 8th.

He also wished to draw attention the of the members to Bye Law 49, which makes provision for the control of the Laws of the Society by all the members. That Bye Law reads, " That any member may make suggestions to the Council regarding changes in the laws by letter addressed to the Secretary. It will be thereby seen that the Council does not attempt to dictate to the Society, but they simply act as the mouthpiece for the Society:

It is intended to bring up for consideration at the Annual General Meeting the question of the desirability of changing the name of the Society, and if any member has any reasonable suggestions to make, and is backed by other members, they should notify the Council, and the suggestions will be considered and presented at the Annual General Meeting.

He wished to exercise his right this year according to Bye Law 27 in nominating two Auditors, who will confer with the Treasurer and audit the accounts for the past year. In future provision will be made for the Auditors to be elected at the Annual General Meeting. He nominated Mr. J. Soby and Mr. W. Thew to audit the accounts for last year.

As no Casual Communications were forthcoming, he called on MR. MONTAGU HOPSON to read his paper.

## A REVIEW OF SOME MODERN THEORIES OF VARIATION AND HEREDITY AND SOME SUGGESTIONS AS TO THEIR APPLICATION TO THE STUDY OF ORTHODONTIA.

BY MONTAGU F. HOPSON, L.D.S.ENG.

I AM happy in the knowledge that no apology is needed for introducing the subject, which you, sir, have just announced as the title of this paper.

Our society approaches its special study in no narrow spirit, but, unfettered by dogma, it seeks for light in dark places and pursues its quest of truth where'er it may be found.

The part which heredity plays in the causation of malocclusion is as yet undetermined. but the many new facts which have been recently discovered, may aid us in the elucidation of this problem. My object this evening is to give a brief review of the subjects of heredity and variation, with some special reference to the more modern work which has been accomplished and to make a few suggestions as to its possible application to the study of orthodontia.

This year of grace 1909, not only marks the centenary of the birth of Charles Darwin, but also the jubilee of the publication of the "Origin of Species."

The principles enunciated in this wonderful book were outlined a year before in joint papers, contributed to the Linnean Society by Darwin and his great compeer, Alfred Russell Wallace, at a meeting held on July 1st, 1858, and it is of some interest to us to recall (as I have pointed out elsewhere) that this meeting was presided over by a dentist in the person of Thomas Bell.

Until the time of Darwin, it had been held by the majority of naturalists, that species were separately created and were immutable. In "The Origin" he adduced facts to prove "that the innumerable species, genera, and families of organic beings with which the world is peopled, have all descended, each within its own class or group, from common parents, and have all been modified in the course of descent." This, as you will observe, is a theory which compounds heredity *plus* variation, and he was convinced that natural selection was the chief means of modification. Thus an individual which showed some variation of advantage to it in the struggle for existence, scored over its fellows, survived, and handed on that variation to its offspring. Darwin believed that these variations were small and increased slowly from generation to generation until they ultimately became pronounced.

Some naturalists to-day believe that many variations, sometimes large in degree appear suddenly and persist, and that it is these variations alone which are of real moment in the production of species. Such have been termed "mutations" by de Vries, and "discontinuous variations" by Bateson. Even if this be true, natural selection must still play its part in permitting the viable to live and causing the non-viable to perish.

All living creatures come from parents more or less like themselves; low down in the scale of life reproduction is asexual, and occurs as the result of fission, budding or similar process. Higher



up in the scale it is sexual and results from the union of a male and female cell. Now it is of importance to remember that in sexual reproduction two things are required, which are quite distinct, a fertilised egg-cell, which possesses certain qualities and possibilities in virtue of its relation to its parents, and an appropriate environment for the supply of food and the various other things necessary for growth and the realisation of those ancestral qualities and possibilities. But no offspring is exactly like its parents. There is always a tendency towards variation. Some of these variations arises as a result of habit, nurture, or environment, others are inherited. It is one of the problems of heredity to determine which qualities are merely acquired characters, derived from without, and which are inherited, that is to say, spring from the germ and are derived from within.

#### ACQUIRED CHARACTERS.

Variations which are due to external influences are spoken of as "acquired characters." An acquired character may be defined as "a structural change in the body of a multicellular organism, involving a deviation from the normal, directly induced during the individual lifetime by a change in environment or in function, (use and disuse), and such as to transcend the limit of organic elasticity, and therefore persists after the factors inducing it have ceased to operate." The generally accepted view is that such variations are not transmitted from parent to offspring. They include such things as increased muscular development, due to exercise, atrophy through disuse, alterations in the shape and contour of bones resulting from specialised activities, trades, occupations, &c. In the same category may be placed induced deformities and mutilations. Thus the Chinese women have for centuries suffered their feet to be compressed in childhood, until a permanent deformity is produced, but there is no evidence that this deformity is handed down to their children. The Jewish race has practised the rite of circumcision from Mosaic times, yet the foreskins of Jewish children are comparable with those of the Christian races. There are some who say that we mutilate the mouths of children by removing certain of their teeth at an early age, but it does not follow that these particular teeth will be wanting in the next generation. As the result of our daily work, many of us possess a callosity on the inner surface of the second finger of the right hand, at the point of the articulation of the terminal phalanxes, but it will not be found on the fingers of our offspring. Of acquired diseases one cannot speak quite so definitely, but I will allude to that question later.

#### GALTON'S LAW OF ANCESTRAL INHERITANCE.

This diagram (Fig. 1) illustrates what is known as Galton's Law of Ancestral Inheritance. It in a measure explains itself. The square represents the ancestral inheritance of an organism. It is supposed to derive one-half from its two parents, one quarter from its grand-parents, one-eighth from its great-grand-parents, and so on. You must understand, however, that this is not to be taken as applying to one particular, or each particular individual, although if it be true, it must apply to several, but as representing the average

inheritance, as ascertained by statistical deduction from a large number of cases. This has been confirmed approximately by Karl Pearson and other exponents of the Biometric School.

But, it may be asked, how are these ancestral qualities handed on from generation to generation, and whence come the variations that arise? We cannot attempt now the consideration of all the suggested solutions of these problems. Let it suffice to say that they have been sought mainly in two directions—(1) in the histology of the germ cells and the maturation of the fertilised ovum; and (2) by actual experiments in breeding. I would remind you, however, that “fertilisation implies an intimate and orderly union of *two* individualities.” To this amphimixis a large number of variations are undoubtedly due.

#### THE CONTINUITY OF THE GERM PLASM.

Weismann has enunciated a theory which is known as “The Continuity of the Germ Plasm.” He believes that there is a specific substance, the “germ plasm” which is the bearer of hereditary qualities, contained in the egg cell. That in the construction of the body, the whole of the germ plasm is not used, a portion being left over and reserved unchanged, for the formation of the germ cells of the following generation. This is represented diagrammatically in Fig. 2. Thomson thus summarises the Weismann theory, “The basis of inheritance—the germ plasm—is in the chromatin of the nucleus of the germ cell. The chromatin takes the form of a definite number of chromosomes or *idants*. The chromosomes consist of *ids*, each of which contains a complete inheritance. Each *id* consists of numerous primary constituents or *determinants*. A determinant is usually a group of *biophors*, the minutest vital units. Hence it is the components of the *id* which contain all the potentialities for the particular parts of a new organism, and these parts will not arise if their particular determinants are wanting. Further, Weismann carries the Darwinian hypothesis back to these determinants, and holds that the struggle for existence, in regard to food and multiplication, occurs amongst these minute living particles, just as it does among organisms themselves, and species and species. It is during this struggle, involving success and defeat, that the selection of *germinal variations* takes place, and those which prove of advantage to the organism are favoured and persist.

#### MENDELISM.

Now I want to direct your attention to a subject which at the present time is attracting great attention and giving rise to much discussion. As long ago as 1865 an Austrian monk, named Gregor Mendel communicated a paper to the Natural History Society of Brünn. and another in 1869, giving the results of experiments he had made in plant hybridisation, and his interpretation of the facts observed. Curiously enough these important papers, although published, passed unheeded. They were re-discovered in 1900, and this has led to the formation of a school of biologists and naturalists, headed in this country by Bateson, actively prosecuting research on Mendelian lines.

Mendel perceiving that organisms *possessed definitely differing characters*, proceeded to investigate experimentally the *heredity* of



each character separately, and he selected the edible pea for his purpose. Mendelian inheritance in its simplest form is represented diagrammatically in Fig. 3. Taking two varieties of the pea which are quite distinct in the matter of height, one producing tall plants and the other short, he crossed them. The cross-bred seeds thus produced all grew into plants which were tall. (Family 1.) Since the quality of tallness asserted itself to the exclusion of the quality of shortness possessed by the other parents, Mendel called it a *dominant* character, and the quality of shortness which disappeared a *recessive* character. The seeds derived from Family 1 produced plants some of which were tall and some short, the average being, 3 tall to 1 short, ; 75 per cent. dominants and 25 per cent. recessives. (Family 2). When the seed from this family was sown, it was found that the recessive short plants produced nothing but short plants, and that they bred permanently true. But the plants from the Family 2 dominants when tested proved to be of two kinds, (a) Plants which gave a mixed Family 3, both tall and short, the proportion being again 3 tall to 1 short, and (b) Plants which gave pure tall only. The ratio of the impure (a) plants to the pure (b) plants, being 2 to 1. From which we see that the Family 2 plants were of three kinds.

Pure dominants.	Impure dominants.	Pure recessives.
1	2	1

or 3 dominants to 1 recessive.

Fig. 4 shows the result of crossing a yellow-seeded with a green-seeded pea. The yellow being the dominant parent.

The Mendelian explanation of the experiment is as follows: The fertilised ovum, or *zygote* as it is called, is compounded of two germ cells or *gametes*, bearing the characters of tallness and shortness respectively. The new germ cells derived from this zygote are bearers either of tallness or shortness, hence there must be a separation of the two characters. This separation is called in Mendelian terms the *Segregation of Unit Characters*, and the characters which separate are described as *allelomorphic*. Hence a single gamete contains one character only, but a zygote may contain either two similar gametes, *i.e.*, both tall, in which case it is called a *homozygote*, or two dissimilar gametes, *i.e.*, tall and short, and is then known as a *heterozygote*. Fig. 5 will help to make this clear.

An experiment made by Biffen is of great interest, and of much practical importance. There are several varieties of wheat which are very susceptible to attacks of the fungoid disease known as "rust." Other varieties are practically immune to these attacks. It was found that when a susceptible plant was crossed with an immune plant, Family 1 were all susceptible, thus showing that susceptibility was dominant to immunity. The continuation of the experiment yielded results which realised the Mendelian expectation. Fig. 6 shows the difference in size between 24 average ears of susceptible wheat, and 24 average ears of immune wheat is most marked; the weight of the former being 22 grms., and of the latter 73 grms., due to the larger amount of grain set.

The skins of the common tabby cat are quite distinct. One has been termed the striped tabby and the other the blotched tabby. The interesting thing about them is, that although these cats have bred together promiscuously for years, no intermediate forms are known, they are all either striped or blotched, thus indicating the segregation of alternative characters and gametic purity.

It must not be assumed that "dominance" is an essential of Mendelian inheritance, for there are cases in which the heterozygous type is intermediate in character between the two pure types, from which intermediate type, however, either pure type may be bred. An excellent example of this is to be found in the case of the blue Andalusian fowl. It is a well-known fact that the eggs from such fowls produce not only blue, but also black, and what are practically white fowls as well, in the proportion of two blues, one white, and one black. The explanation is that the blues are heterozygotes, and the blacks and whites homozygotes, and should breed true. Such has been actually proved to be the case.

It also shows us how a "reversion" occurs, viz., that it is due to the meeting of two similar factors, which although present in the parents, were held in abeyance by the presence of some other factor.

These simple examples which we have just considered, deal with but a single unit character, pure in type, when crossed with another single unit character, also pure in type. But you will at once realise the possibilities which exist when impure dominants are crossed with pure dominants or recessives, and when an organism possessing multiple unit characters is crossed with another possessing multiple unit characters. To quote Bateson "The essential deduction from the discovery of segregation was that the characters of living things are dependent on the presence of definite elements or factors, which are treated as units in the processes of Heredity. These factors can thus be recombined in various ways. They act sometimes separately, and sometimes they interact in conjunction with each other, producing their various effects. All this indicates a definiteness and specific order in heredity, and therefore in variation."

Are diseases hereditary? This is a question answered by most biologists in the negative, and by many physicians in the affirmative and the answer given depends in no small measure on the respective points of view. It must be remembered that the term hereditary is often used when the word congenital would be more applicable. Thus it is a mistake to speak of "hereditary" syphilis. Syphilis is due to infection by a micro-organism, and whether the infection takes place before or after birth has nothing to do with inheritance. The same may be said of other microbic diseases, and it is important to guard against mistaking re-infection for transmission. On the other hand there appears to be grounds for believing that a predisposition to certain diseases may be inherited, a view not uncommonly held with regard to tuberculosis, and in this connection we may recall the Mendelian experiments with wheats susceptible and immune to "rust."

The difficulties in the way of applying the principles of Mendelian inheritance to man are, of course, very great. Man is a being com-



# GALTON'S LAW OF ANCESTRAL INHERITANCE

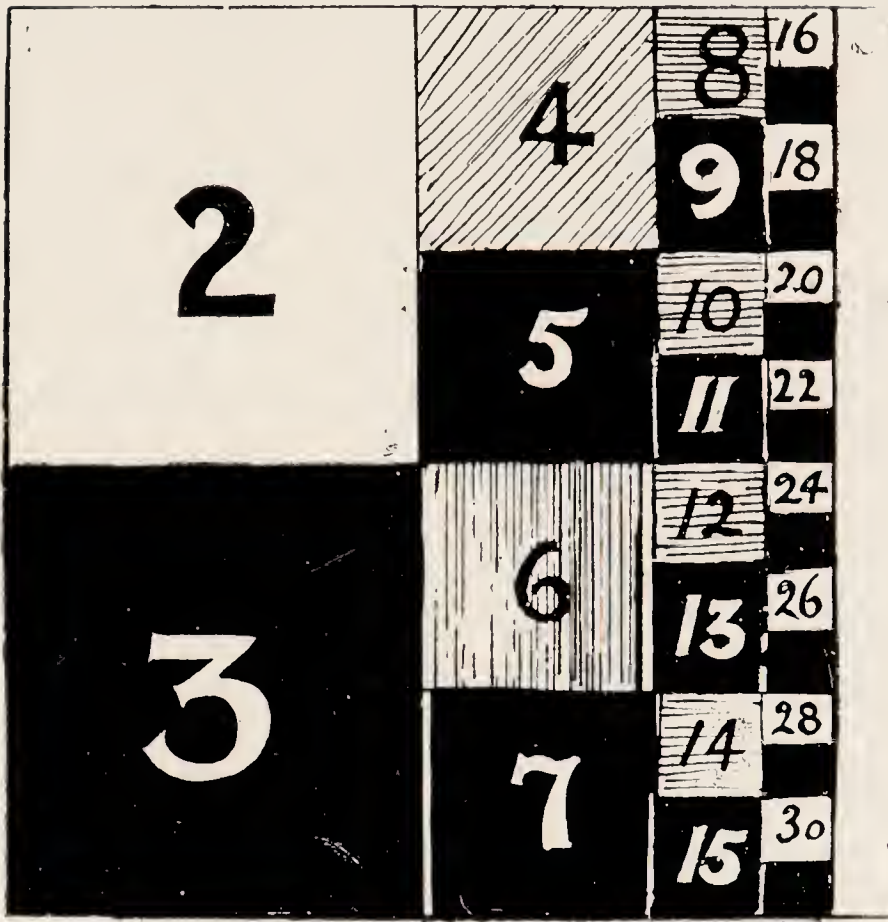


FIG. 1. (After A. J. MESTON.)

# CONTINUITY OF GERM-PLASM

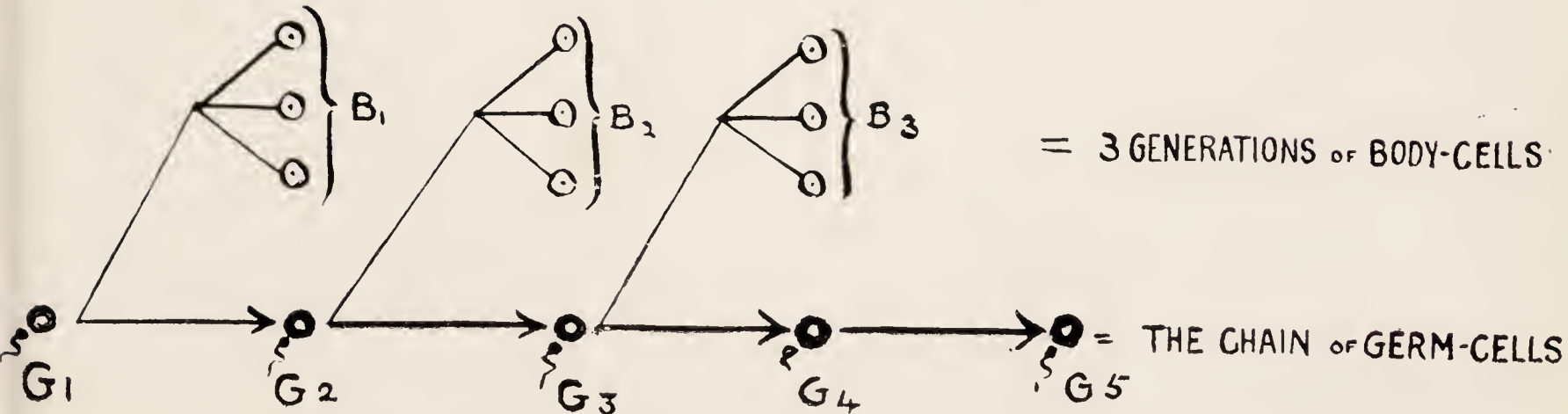


FIG. 2. (Modified from E. B. WILSON.)

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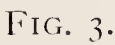






FIG. 6.

## HAEMOPHILIA

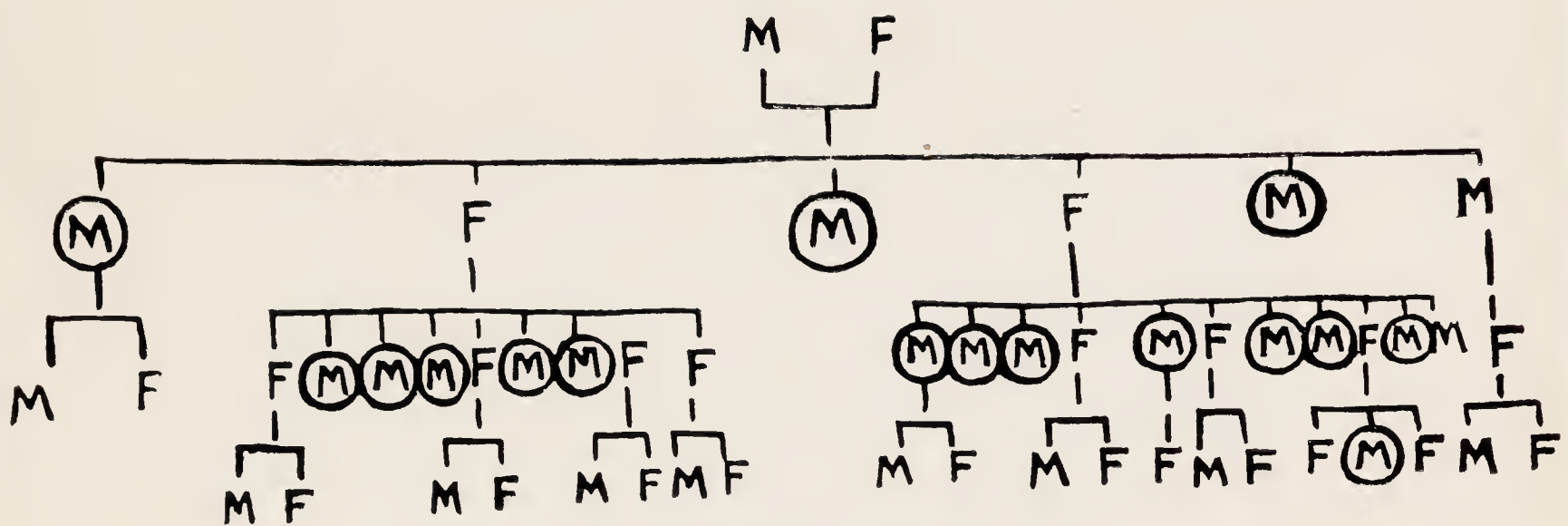


FIG. 7. (After TURNER.)

## COLOUR-BLINDNESS

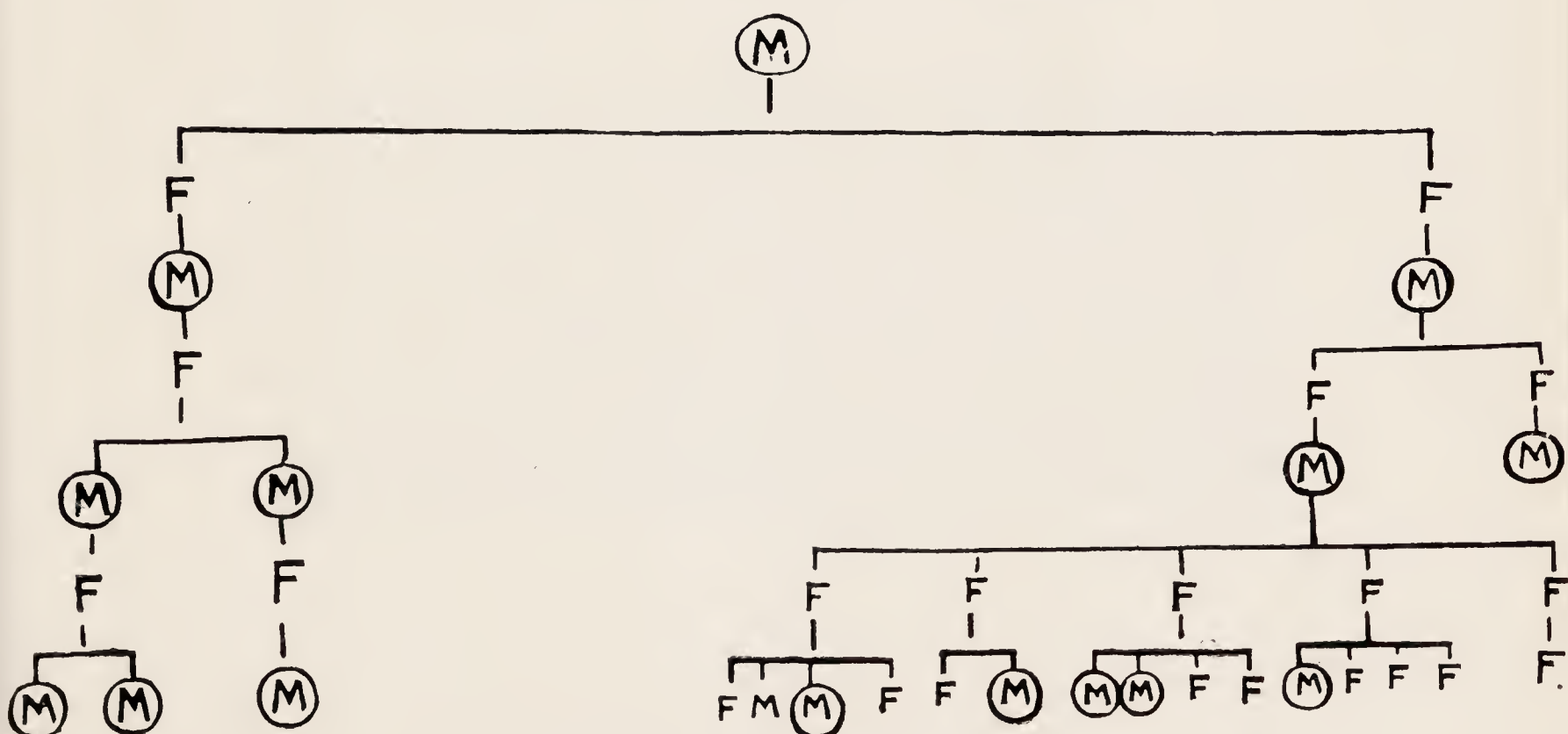


FIG. 8. (After HORNER.)





FIG. 9.



FIG. 10.



FIG. 11.



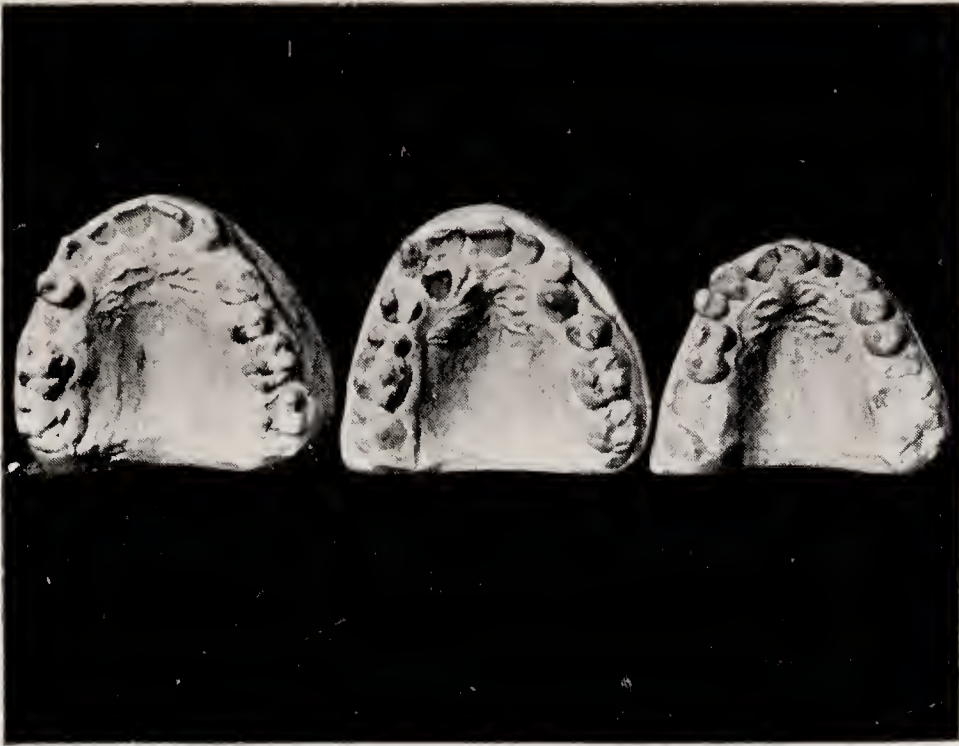


FIG. 12.



FIG. 13.

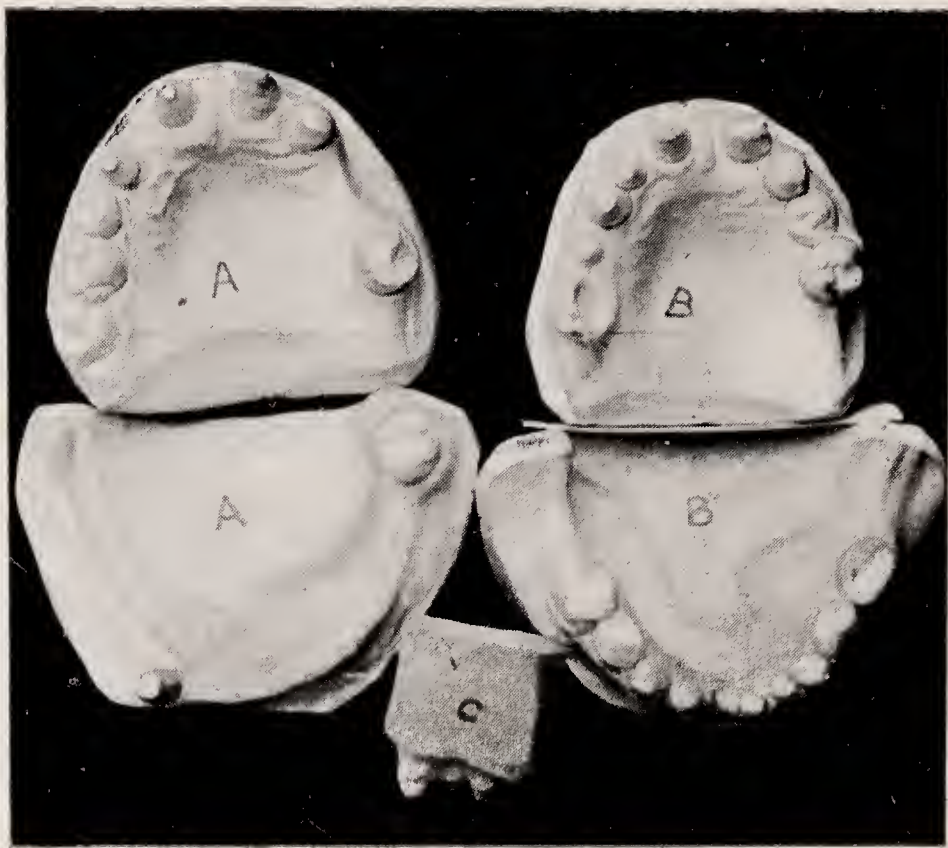


FIG. 14.



FIG. 15.



FIG. 16.



# SUPERNUMERARY TEETH

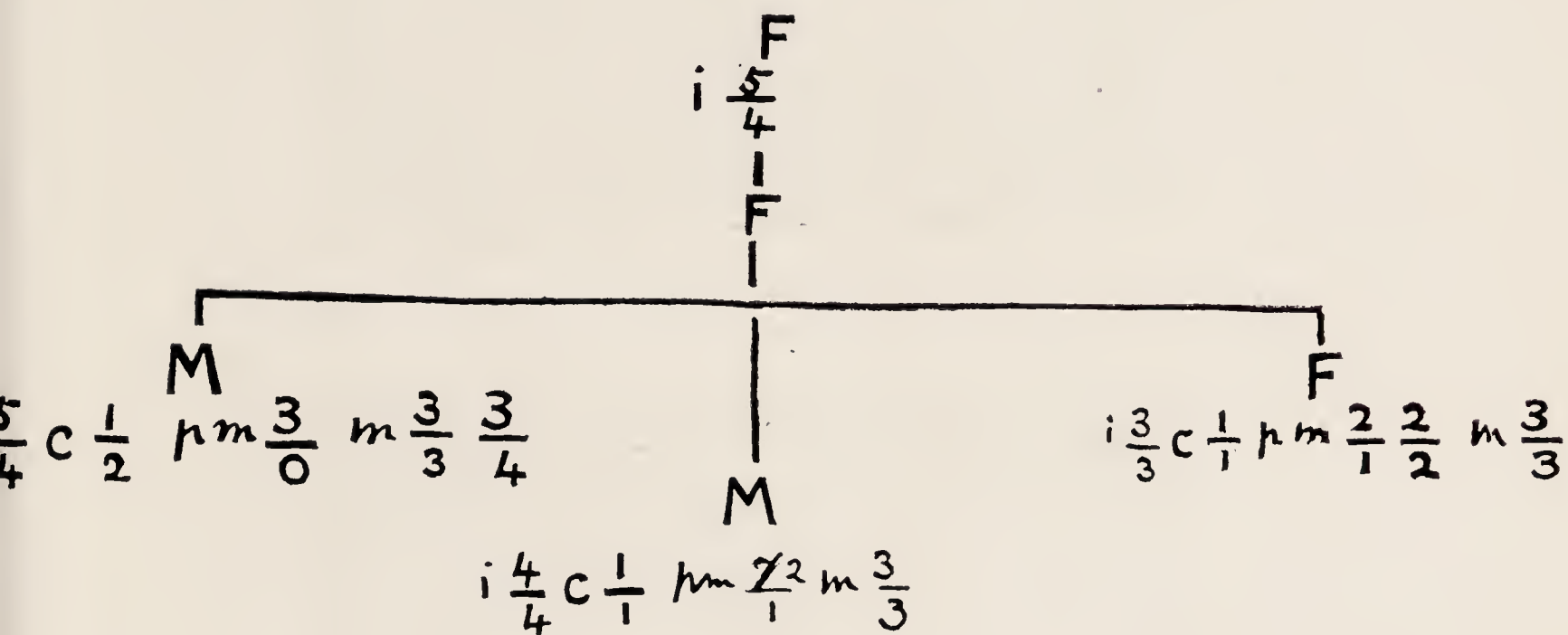


FIG. 17.



FIG. 18.

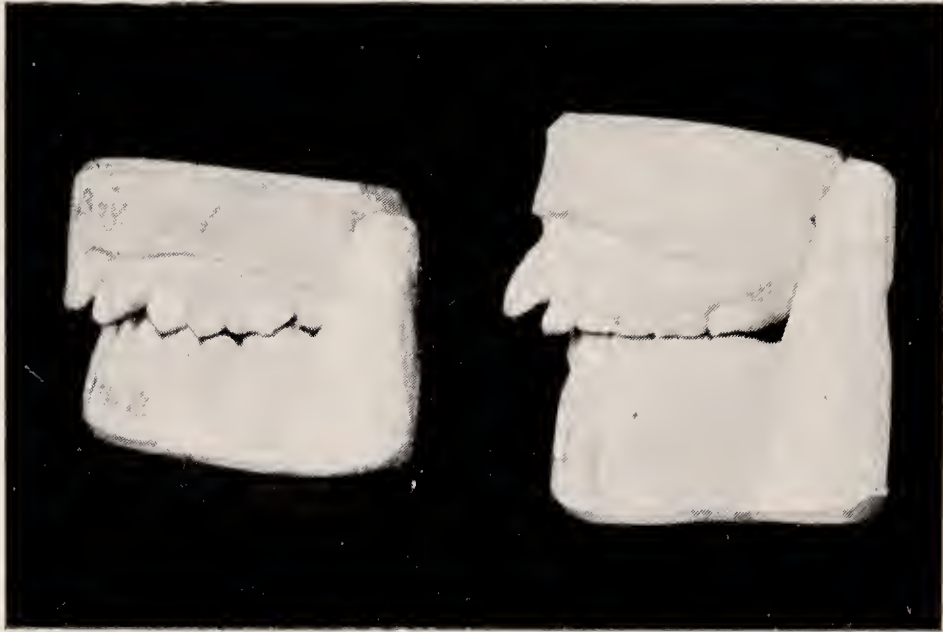


FIG. 19.

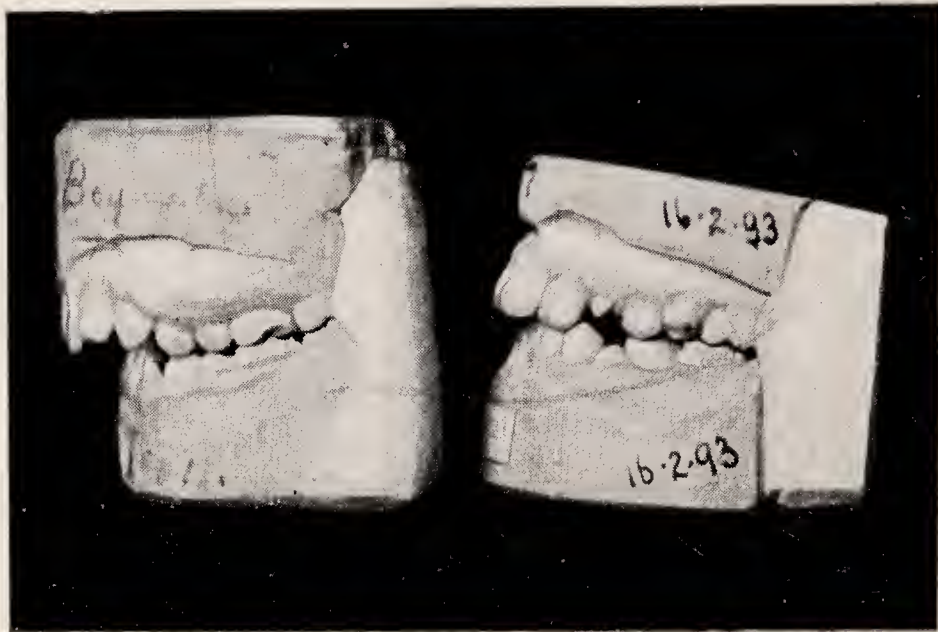


FIG. 20.



FIG. 21.



prising a great complex of characters, and he lives in an environment which is largely self-imposed and artificial. It is not easy to ascertain the purity of type, for his period of generation is very long and close inbreeding is impossible.

There are, however, certain peculiarities and deformities which are definitely heritable, and some are of special interest because the transmission is sex-limited. Fig. 7 is the pedigree of a family with that marked hæmorrhagic tendency known as hæmophilia, and you will notice that it is transmitted through the females to the males. The Mendelian explanation of this sex-limited transmission is that the hæmorrhagic factor is dominant in males and recessive in females, "if the males contain the factor for the condition they exhibit it; consequently the affected males can transmit, while the unaffected males cannot. In the females, on the contrary, something—almost certainly the presence of some other factor—prevents or inhibits the development of the condition, and then they may possess the factor without its making itself apparent. Such females may then transmit it to their offspring, but it will only be visible in the males, except in the rare case of a union between a heterozygous female and an affected male."

Fig. 8 shows a similar state of affairs with regard to colour-blindness.

Family pedigrees have been published, showing the inheritance of such abnormalities as brachydactylism and polydactylism.

Fig. 9 is taken from the models of the mouth of a man with very marked hypertrophy of the gums. Figs. 10 and 11 show that a similar condition is appearing in the mouths of two of his children. These cases were recorded by me in the Trans. Odont. Soc., Vol. 32

A deficiency in the number of the teeth in the mouths of several members of the same family is not at all uncommon. Thus the lateral incisor is frequently absent, or it may be represented on one side by a tooth dwarfed in size and conical in shape.

I recall a typical case in my own practice. The father has no lateral incisors, but the mother is normal. There are six children, five have no laterals, and one is normal. These figures are, of course, not Mendelian, but we have no evidence that the fertility of the mother has been tested to the full.

Fig. 12 is taken from the models of two brothers and a sister; one boy has an upper lateral incisor missing, the other has a persistent temporary canine, and the upper left premolar is absent; the sister has also a retained temporary canine, the right lateral is absent and the left dwarfed.

Fig. 13 is from the models of the mouths of twins, both of which show the absence of teeth.

Fig. 14 the models of the mouths of three brothers. The eldest aged 12 years, has an extremely aberrant dentition, having but two teeth in his mandible, whilst such teeth as are present in the maxillæ are rudimentary in character. He also possesses extremely small nails. You will notice that the teeth of the second boy, aged 10 years, are of a similar type. The small model is that of the youngest, aged 10 months, so far he has erupted but two teeth in the upper incisor region; they are mere cones, and



widely separated. Fig. 15 shows you the models of the mouths of three cousins of the above. Two of them present similarly aberrant teeth, whilst one is normal. All three are girls, aged 16, 12, and seven years. The relationship between these children is close, the fathers being brothers and the mothers sisters. Most unfortunately I was unable to complete the examination, as the families disappeared and could not be traced. The teeth of the mother of the first three children were normal, as were also those of another sister, whose children were normal. I surmise, therefore, that the character has been inherited from the fathers.

Fig. 16 shows dentitions less aberrant in character, occurring in the mouths of three sisters. You will notice the curious form of the teeth, how that some of the cusps are dwarfed, whilst others are over developed. This case was recorded by C. Robbins.

I find it more difficult to discover instances of supernumerary teeth existing in the mouths of several members of the same family, but I see no reason to suppose that they are as rare as the paucity of records indicates. Fig. 17 is the pedigree of a remarkable case quoted by Tomes.

The diminutive supernumerary tooth in Fig. 18 was correlated with a supernumerary rib in a man aged 25. A brother of this man had three extra ribs and an elder sister two extra ribs.

It is not an altogether uncommon thing to find instances of a particular tooth or teeth being misplaced in several members of the same family. I have under my care at the present time a lady whose upper central incisors have their distal angles everted and **thrown** forwards. She has four children, all of whom possess precisely the same peculiarity, and there is no general crowding of the teeth to account for it.

Tomes has drawn attention to the portraits of Charles the Fifth of Spain and his son Philip the Second, which together with those of other members of the family, present the prominent Burgundian lower jaws, and the Hapsburg lip, a peculiarity possessed by the present reigning monarch of that country. In the same manner V-shaped arches may be traced back through many generations, as a family characteristic, if portrait painters are to be relied upon.

Fig. 19 shows a case of superior protrusion in the mouth of a boy aged 10 years, and the same condition in the mouth of a brother aged 11 years. Fig. 20 the models of the mouths of another brother and a sister, aged 12 and 11 years respectively, both showing the same condition. Here, then, is a typical deformity occurring in the mouths of four members of a family, but that fact does not necessarily prove that the condition is hereditary.

Compare these cases with those depicted in Fig. 21. Here we see two well-marked examples of open-bite. The patients are sisters. Both the children have been operated on recently for adenoids. The mother also has an open-bite; she may have had adenoids, too, but there is no evidence as to that.

Now it is generally admitted that both these forms of malocclusion, are intimately associated with, and probably dependent upon, obstructed nasal respiration. If we regard the adenoids, as an acquired character impressed on the mother from without,



and which reappeared in the children, as a result of the same environmental conditions, the malocclusion cannot be said to be inherited, nor has it been proved yet that the susceptibility to adenoids is inherited.

Many writers to-day protest against the theory that a general crowding of the teeth may be due to the inter-marriage of parents possessing large jaws with large teeth, and small jaws with small teeth respectively, and the inheritance of the small jaws of one parent and the large teeth of the other. Whether the size of the teeth may be regarded as a unit character, and the size of the jaws as another unit character is unknown. It is certain, however, that we see many instances in which the teeth are too small for the jaws, and it is quite as reasonable to regard other teeth as too large.

It must be remembered that the size of the permanent teeth is fixed and determined at a very early age, and no external influence can modify, to any appreciable extent, the size of the crowns, once they have been laid down, whilst many external factors may contribute to hinder and arrest the full development of the jaws which have to accommodate them. Hence we may take it as certain that many cases of malocclusion are definitely acquired and are non-transmissible.

Experimental work on Mendelian lines has already proved that amphimixis by no means always results in a mere blending of the characters possessed by the respective parents, but that in many instances a definite segregation occurs. In the light of our present knowledge we are not justified in saying that heredity plays no part in the production of malocclusion. It appears to me, sir, that this society would be doing useful work if it commenced to collect evidence and material, which would help in the elucidation of this interesting and important problem.

N.B.—Figs. 12, 13, 16, 18, 19, 20 are taken from specimens in the Odontological Museum of the Royal College of Surgeons, England, and Figs. 1, 2, 3, 7, 8, 14, 15, 17, and 21 by the courtesy of *Guy's Hospital Gazette*.

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Tomes, J. and C.—Dental Surgery.

Wallace, J. Sim.—Irregularities of the Teeth.

#### DISCUSSION ON MR. HOPSON'S PAPER.

The PRESIDENT: I don't propose to make any remarks on Mr. Hopson's paper myself, but only thank him for bringing it forward and tell him how interested I have been in it. I have been reading lately some books on heredity and find it a very complex subject.

MR. BALDWIN : I must say I don't agree that Mendelian inheritance applies much to human beings. When you get a mixed marriage between white persons and negroes you get invariably a part-coloured offspring. Do you ever get a Mulatto throwing off a black or a white baby ?

MR. HOPSON : Yes.

MR. GEORGE THOMSON : I would like to tell you of the difficulties I have on this subject. Of course, one would not attempt for a moment to criticise what Mr. Hopson has given us of the theories of Weissmann, Mendel, etc., but I would like just to touch upon that part concerning the inheritance of teeth. Mr. Hopson said no offspring resembled its parent. Which parent ? If we are going to trace it down through the parent we easily find that the teeth, jaws etc., resemble either the father or the mother. But then as Mr. Hopson said, they are not alike. That means they are either similar, or different, or opposite to one parent. Then I get tangled up.

Now referring to the models which were shown on the absence of teeth, you will see it is mostly, I think always, permanent teeth. To use Mr. Hopson's term at what age were these teeth laid down ? That brings me to this point. At the time of birth we find children are born with a dental armature perfect, except in about 10 per cent. of cases ; that is, 90 per cent. of the children born into the world are healthy and normal. If that is the case then it does not matter to us about inheritance at all. What we have to consider is this. They are starved soon after birth. Take a suburban street where one often hears of the birth of a child, normal and healthy ; in a few weeks the neighbours know how great are the difficulties of keeping it alive. Experiments in feeding the child are being carried on instead of supplying it with Nature's food.

Malnutrition after birth is the fault and not the conditions before birth, inherited or not. We are told that a degeneracy has taken place in our teeth and jaws due to evolution, but we often see to-day teeth and jaws as well developed as the teeth of primitive man and my contention is that where we find defective teeth and jaws it is the result of individual malnutrition chiefly and not inheritance.

The Heidelberg remains of which I have seen casts lately at the Natural History Museum present teeth and jaws not very different from some we see to-day. To quote an extract : " But against these must be set the presence of a complete set of teeth agreeing in dentition with those of the human race to-day, and presenting most marked variations from those of any of the anthropoids. The difference is so marked as to lead anthropologists to regard the human dentition as more primitive than that of the ape family, and it is now generally admitted that no anthropoid stage immediately preceded the age of the Heidelberg man."

I find in a voluminous work by Bruchard the following : " It is quite possible that the systemic condition of the mother during gestation may profoundly modify the anatomico physiological condition of the body cells of the child." These are large words covering a misconception of the subject. The point is that the child ob-



tains its full supply of nourishment at the expense and in spite of its mother's condition. We ought, therefore, to be much more concerned with the environment of the child from birth than with its inheritance. I am very much indebted to Mr. Hopson for bringing this subject before us in such an able manner and I think it is a subject about which we should all know as much as we possibly can.

DR. SIM WALLACE said, questions in heredity seem ever-lastingly to be prejudiced by references to what are very unusual and very rare. Cases of inherited abnormality in the arrangement of the teeth are very seldom found ; while cases of the inheritances of the normal arrangement are almost universal. Although we do get inherited freaks like deficiency in the number of teeth, they are exceptional and consequently of relatively little importance. The general law seems to be that abnormalities are acquired and not inherited. Harmful abnormalities like irregularities of the teeth may be inherited in one case in 50, but it is only the normal that seem to be inherited permanently.

Mr. Hopson said we see many cases in which the teeth seem to be too small for the jaws. He (Dr. Wallace) had seen but one such case and that case was associated with a deficiency in number of teeth. He had never seen a single case with 32 teeth in the jaw where they seemed to him to be too small for it. There is sometimes a slight spacing in the upper incisors region, but we can not call that abnormal. It is a variation within the normal. But admitting that these are quite exceptional cases where the teeth are too small for the jaw as the result of inheritance, then he would also admit that a corresponding proportion may inherit the opposite, that is teeth which are too large for the size of the jaw inherited.

With regard to the King of Spain and his jaw, he did not know the solution. However, he was operated on for adenoids, and it is quite possible the smallness of his upper jaw is due to nasal obstruction, and judging from the cases one sees in practice it is quite probable.

THE PRESIDENT : I don't know if any of the members have seen a photograph of the young Prince of Asturias ; he is very distinctly Class 3. I do not know if he has been operated on for nasal obstruction, but I think it would be easy to find out. In a book entitled, "Heredity in Royalty" a great feature is made of the Hapsburg jaw, which can be traced through many generations. Women and men both have it.

MR. RUSHTON : When I used to attend meetings years ago, heredity used to be a very convenient scapegoat for anything we came across we could not understand, and I am very glad we are now getting rid of that bogey, because I think it has been a bogey not only to us, but also to the general public. We still hear patients say : "That is in the family," etc. Probably it is nothing of the sort. I think every paper that would lead us to critically suspect heredity in disease is a step in the right direction. Mr. Hopson has told us that syphilis is not hereditary, and in the same way it may be in course of time found out that mental instability is also not hereditary. I am convinced that most dental irregularities which

are possible to correct do not occur from heredity, but from environment. As regards comparative size of teeth and jaws, I am of opinion there are jaws where the teeth are abnormally large or abnormally small for them, as in those cases where the teeth are separated from each other. I cannot say whether these result from any hereditary cause, but all the same they certainly do occur. I think we ought to thank Mr. Hopson very much indeed for his paper.

MR. CHAPMAN: I would like to add my word of thanks to what has been said. I regret not being able to discuss the matter. I have been especially struck with his four models and illustrations. I have seen to-day two brothers, aged 5 and 3 years respectively. The one, aged 5, was certainly normal, but the one aged 3 is rather abnormal. The father has bad occlusion, with large overbite. The mother, as far as I could judge, was normal. I think this brings us to the point that "class two" cases must begin very early. I cannot conceive of any cause that has been at work in these patients to bring about malocclusion at so early an age. Therefore it occurs to me that heredity is the cause of it, though it may be due to environment or some other cause. I think this is a most interesting problem, and it is worth our further investigation. I have heard of small teeth in large jaws. I remember one case distinctly in which I saw what I should call abnormally large teeth, but I think that might be called a freak case. Otherwise it seems to me teeth are never too large or too small for the jaws.

MR. HOPSON, in reply, said: I thank you, sir, for your kind and appreciative remarks respecting this paper.

With regard to Mr. Baldwin's question—every now and then you get a case where the offspring of white and black parents resembles one parent only, being definitely white or black and not a mulatto: more than this, it may occur in the offspring of a mulatto and a white. Mr. Thomson made some interesting remarks, which, if I understood them correctly, favoured the view that "nurture" is of more importance than "nature." I did emphasise the point that external factors have a great deal to do with the causation of a large number of so-called Class 2 cases. I am not, however, in agreement with him when he suggests that such things as the absence of teeth may be due to malnutrition, for there may be a deficiency in the number of teeth in the first dentition as well as in the permanent; nor is there any evidence to prove that such abnormalities occur more frequently amongst the ill-nourished, than amongst the well fed children. Again all our knowledge of the development of teeth is against such a view. Of course malnutrition of the mother may affect the health of the germ cells to a certain extent, but not to such a degree as to result in the suppression of an organ altogether. I am almost in entire agreement with what Dr. Sim Wallace has said. He questions my statement as to the frequency of the occurrence of cases in which the teeth may be regarded as too small for the jaws. In my experience such cases are by no means rare, although there may be differences in degree. I refer particularly to teeth which are



spaced, and where the normal lateral occlusion, on which so much store is set, is absent, and this without a suspicion of protrusion. The condition seems to be confined to the incisor and premolar regions.

Carefully collected pedigrees tend to show that abnormalities are inherited to a much greater extent than Dr. Sim Wallace is willing to admit; for instance, Mr. Nettleship has published a pedigree, involving hundreds of people and covering ten generations in which stationary night blindness persisted. Fortunately, it is the normal which is usually inherited, a mere fluctuation of a non-germinal kind disappears, hence the security of a fixation of type, but without variation plus heredity there could have been no evolution.

With regard to the case Mr. Chapman has mentioned, it was pointed out a long time ago by Mr. Campion that distal occlusion in the permanent dentition is often foreshadowed by its existence in the temporary dentition.

I do say that we have not sufficient evidence to enable us to state definitely that heredity has anything to do, or nothing to do, with the causation of malocclusion. I ask for data to prove or disprove one or the other.

That certain characters behave as units in the processes of heredity in certain animals and plants must be accepted as an established fact, and it is just possible that careful investigation may show that some of the principles of Mendelian inheritance may apply to the teeth and maxillæ of man. I thank you very heartily for the kind attention you have given me.

The PRESIDENT: I rise with very great pleasure to thank Mr. Hopson for his most interesting contribution to this society, and as this is the last of our ordinary meetings for this year, I would like to take the opportunity of saying that I hope we shall have very full meetings in the future, and the discussions become more general, and that none of us will ever fail to take part in the discussions of the British Society for the Study of Orthodontia.

Our next meeting takes place on December 8th. It is the annual general meeting, and I hope you will bear in mind the bye-laws which I read out at the beginning of the meeting.

The meeting then closed.

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ANNUAL GENERAL MEETING.

THE annual general meeting of the British Society for the Study of Orthodontia was held at the rooms of the Medical Society of London, Chandos Street, W., on Wednesday, December 8th, the President, MR. NORTHCROFT, in the chair.

Owing to the unavoidable absence of the hon. secretary, Mr. Spiller read the minutes of the last meeting, which were duly signed.

Messrs. F. G. H. Armin, L.D.S., and H. T. Porteous, L.D.S., were elected members.

The Hon. Treasurer then read his report. MR. BALDWIN proposed, and MR. SCHELLING seconded, that it be received and adopted. Carried unanimously.

HON. TREASURER'S REPORT.

In reporting on the finances of the British Society for the Study of Orthodontia, I am glad to be able to state that our income shows a satisfactory increase as compared with that for last year.

This is the first occasion on which it is possible to present a statement covering the whole of a financial year, as when the Balance Sheet for 1907-1908 was prepared certain accounts for expenses incurred during that period had not been received.

The balance £12 11s. 2d. carried forward, is not so large as last year, as your Council found it desirable to purchase a High Power Projection Lantern and accessories for the exhibition of members' slides.

From the working during the past few months it has been possible to ascertain how our finances may be distributed so as to obtain the best results, and your Council hopes to arrange in future that any slides required by members may be prepared free of cost, but remain the property of the Society.

(Signed) E. J. MELLERSH.

STATEMENT OF ACCOUNTS from 1st December, 1908, to 30th November, 1909.

RECEIPTS.

1907-1908.				1908-1909.			
£	s.	d.		£	s.	d.	
64	1	0	To Balance in hand .. .. .	25	16	2	
64	1	0	„ Subscriptions received during year .. .. .	70	7	0	
<hr/>				<hr/>			
£64	1	0		£96	3	2	
<hr/>				<hr/>			

EXPENDITURE.									
1907-1908.					1908-1909.				
£	s.	d.			£	s.	d.		
9	19	6	By Rent	.. .. .	15	15	0		
7	7	0	„ Reporting	.. .. .	14	14	0		
10	10	9	„ Printing and Stationery	.. .. .	16	10	6		
—	—	—	„ Process Blocks	.. .. .	5	10	0		
—	—	—	„ Library Books	.. .. .	2	2	0		
2	2	6	„ Lantern and Accessories	.. .. .	17	16	9		
—	—	—	„ Normal Arch Committee's Expenses	.. .. .	2	0	4		
4	10	0	„ Refreshments	.. .. .	5	4	11		
1	14	6	„ Hon. Secretary's Petty Cash	.. .. .	0	18	6		
1	0	0	„ Hon. Treasurer's Petty Cash	.. .. .	2	0	0		
—	—	—	„ Notice Board	.. .. .	0	15	6		
1	0	7	„ Sundry Expenses	.. .. .	0	4	5		
25	16	2	„ Balance carried forward	.. .. .	12	11	2		
<hr/> £64 1 0					<hr/> £96 3 2				

## HON. TREASURER'S PETTY CASH.

1908.					£	s.	d.
Dec. 1.	To Balance in hand	..	..	..	0	3	11
—	„ Cheque	..	..	..	1	1	0
—	„ Cheque	..	..	..	1	0	0
1909.							
Feb.							
					<hr/> £2 3 11		

	£	s.	d.
By Gratuities	0	12	6
„ File	0	1	0
„ Plaster of Paris	0	2	3
„ Stamps, Telephones and Sundry Expenses	1	4	9
„ Balance in hand	0	3	5
	<hr/> £2 3 11		

We have examined the Books and Vouchers, and certify the above statement to be correct.

WILTON THEW } Hon. Auditors.  
JAMES SCOBIE }

The Hon. Secretary's report was read by Mr. SPILLER, its adoption being proposed by MR. BADCOCK, seconded by DR. SIM WALLACE and carried.

## THE HON. SECRETARY'S REPORT.

The Honorary Secretary of the British Society for the Study of Orthodontia begs to report that the year ending December 8th, 1909, has been a very interesting and instructive one, if one may judge from the regularity of the attendance of certain members of the Society.

Eight ordinary meetings have been held, at four of which papers have been read, accompanied by lantern slides and diagrams. One was devoted to the report of the Committee on "The determination of the Normal Arch," two to an exhibition of some of the work that has been done by members, and one to Demonstrations.

Four new members have been added to our Society, and two original members have resigned owing to their inability to attend the meetings. It is hoped, however, that the Transactions will prove sufficiently valuable to retain such members in our ranks in the future.



A Committee has been appointed with Mr. J. G. Turner as Chairman, to determine, if possible, the phenomena noted in cases of distal occlusion.

The Secretary regrets that he found it necessary, on more than one occasion during the past year, to ask for papers from gentlemen who were not members of the Society, and he hopes that members will make some special effort during the coming year to contribute either papers, demonstrations, or clinical work, so that in future not more than one paper, at most, emanates from sources outside the Society, thereby lightening the work of the officials, and creating the feeling that there is plenty of material in reserve to fall back upon. The Secretary will be pleased to hear from members who will undertake such work during the coming year, so that as a group of students they may all help one another rather than leave the burden of the work to a few.

The Secretary begs to apologise to the members of the Society for his unavoidable absence from the General Meeting, and to tender his thanks to the President and Hon. Treasurer for attending to his duties during his absence.

(Signed) A. C. LOCKETT, Hon. Sec.

The Librarian's and the Curator's reports were then received and adopted.

#### HON. LIBRARIAN'S REPORT.

I have the pleasure to report that the library has made good progress during the past year, and it is gratifying that this is largely due to the generosity of members of the Society. Seven volumes have been added, viz. :—

Case's "Orthodontia" (purchased).

Angle's "Malocclusion" (presented by Mr. Geo. Northcroft).

Jackson's "Orthodontia" (presented by Mr. E. R. Tebbitt).

Talbot's "Irregularities" (presented by Mr. E. R. Tebbitt).

Guildford's "Orthodontia" (presented by Mr. J. E. Spiller).

"Transactions B.S.S.O., 1908" (2 vols.).

In addition we have a collection of various papers and essays, presented by Mr. Hubert C. Visick, and the literature collected by the Committee appointed to investigate the work that had been done on the proportions of the Normal Dental Arches. It is proposed to add a selection of these to the library in the form of bound volumes.

Offers of donations of books have also been made by other members, but the limited number of works on Orthodontia and allied subjects renders a choice of new books a difficult matter, and I should be grateful for suggestions on this subject.

On behalf of the Society I take this opportunity of thanking members for their kind promises of help, and others for their donation of books, and I can promise all future gifts a cordial welcome.

The library accommodation is hardly satisfactory, but at present this is identical with that of the Museum. I leave this subject to our Curator, as I believe he is reporting on it.

Library regulations have been drawn up and approved by your Council, and although these allow great facilities for the lending of books it would appear that this fact is not fully appreciated, as the amount of borrowing by members has not been as great as might be expected, considering the amount of valuable books at their disposal.

(Signed) J. E. SPILLER.

#### HON. CURATOR'S REPORT.

December, 1909.

GENTLEMEN,—The task of the Curator in making the report for the last year is a particularly easy one.

Only one specimen, a Northcroft Plaster Plane, presented by Mr. George Northcroft, has been added to the Museum.

The specimens are at present on view in the Museum, which is housed in a case in the lobby. Several shelves are waiting to be filled.

I should like to suggest that all members who have cases of particular interest, or appliances which they have found of special use in the treatment of cases, should present duplicates of such cases or appliances to the Museum, where they would be placed under the name of the donor, and where they could be seen and examined on application being made to the Curator.

Only by the support of the members can the Museum become enlarged, and incidentally of more use to the members and worthy of the British Society for the Study of Orthodontia.

I should also like to suggest that members bringing before the Society casual communications or clinics, might, with advantage, present or lend such cases to the Museum, where they could be seen by those members who were unfortunate enough not to be present at the time when the cases were brought forward.

It has been suggested by Mr. J. G. Turner "that articulated models of children of all ages, normal and abnormal, with the age and history attached, be procured and placed in the Museum." I shall be pleased to accept all such cases on behalf of the Society, and am sure that when the shelves, already at our disposal, are filled up, room will be found elsewhere, so that no anxiety need be felt, as regards overcrowding.

I should like to take this opportunity of reminding members that there is a "Suggestion Book" for the Museum, placed outside before all meetings. Any suggestions made in this book will be brought, in due course, before the notice of the Council. But suggestions alone will not fill a museum, or make interesting specimens, so that the practical help and support of all the members is most earnestly requested.

HEDLEY C. VISICK.

The Society then discussed the alterations and amendments of bye-laws.

The council recommended the change of title to "The British Society for the Study of Orthodontics."

The PRESIDENT then asked the members to vote first if they thought any change desirable in the name of the society.

The vote showed that the change was thought desirable.

Continuing, he then said that it was decided by this meeting that some change should take place in the name of the society. The council having discussed this matter at some length, thought it desirable, if any change were made, the name of the society should be "The British Society for the Study of Orthodontics." He said he would like to hear the remarks of any members on this point, but they had had the opinion of Dr. Murray the great philologist, of Oxford, to guide them.

MR. SCHELLING, as the originator of the suggested new title, here explained why he introduced the word Orthodontics.

MR. SCHELLING proposed, and Mr. BALDWIN seconded, that the title of the society should be changed to the above, and after being put to the meeting, the motion was carried.

The PRESIDENT explained that the council had considered other suggested titles, but did not think them suitable.

It was then announced that owing to an unfortunate irregularity in the nomination of councillors, no voting could take place, and



the ballot papers would be invalid. New voting papers were, however, to be sent out during the following week, and these were to be returned to the secretary at the address of the Medical Society of London's Rooms, 11, Chandos Street, W., by the date mentioned on the papers. The election of the rest of the officers would hold good.

MR. RUSHTON: In our bye-laws is there any provision for a postal ballot?

PRESIDENT: The postal ballot has arisen as a matter of convenience, so that as many voters as possible should be represented. He would like to ask Mr. Badcock's views as to whether one member is allowed to bring another member's paper as Mr. Schilling had done?

MR. BADCOCK: What was in my mind was the possibility that a member desiring to perpetrate such a fraud, might obtain several ballot papers, fill them in himself, and hand them in as belonging to other absent members. It is true that only one ballot paper is issued to each member, but such papers are not strictly guarded and might easily get into the wrong hands?

THE PRESIDENT thanked Mr. Badcock for his explanation, and ruled Mr. Schilling's friend's ballot paper invalid. He thought, however, this objection could be removed by the rule which is adopted in many other societies, *i.e.*, that any papers sent by post should contain the name of the sender on the envelope enclosing it. That point would be made a note of and attended to at the next ballot.

The next alteration proposed by the council was then voted on, *viz.*, that bye-law 16 should read as follows:— "That officers, councillors and two auditors should be elected from the ordinary members by ballot annually at the meeting in December, and all members residing within the United Kingdom shall be summoned to this meeting by letter, a week's notice being given, and the hour of the meeting stated."

The PRESIDENT explained that the alteration was wanted, so that the auditors could be nominated at the annual general meeting and serve for the ensuing year. Carried. He asked for permission to propose from the chair that a postal ballot for councillors be allowed to take place, and that such election should be considered valid for the ensuing year and retrospective, *i.e.*, that a postal ballot for the councillors which would take place in a week's time would be considered as exactly the same as if it had taken place at the meeting. Agreed.

It was then proposed that in bye-law 18 the words, "Recommended by the council" should read, "Nominated by the council." It was felt the council did not wish to force their opinion on the Society, and it was merely to facilitate the preparation of the ballot list that they nominated certain members to fill the various offices of this society and it was thought desirable to change the word "recommended" to "nominated" to fall in with bye-law 20. Agreed.

It was then proposed that in bye-law 20, the words, "At least 21 days" should be inserted after the word "received." It was

felt that nominations for various posts in the society should not take place at the meeting itself, but that four properly qualified members might make such nominations at least 21 days prior to the annual general meeting. Agreed.

It was proposed that bye-law 27 should read, "Two members chosen by ballot at the previous annual general meeting should audit the accounts of the hon. treasurer for the ensuing year." Agreed.

It was considered that bye-law 46 needed revising, to read as follows:—"The annual meeting of the society for the election of officers and councillors, and for the reception of the annual reports of the hon. treasurer and other officers and any other business shall be held in the month of December every year." No provision had, up to the present moment, been made for the annual reports of the society's officers, and it was felt necessary that they should give a report on their various offices. Agreed.

MR. SCHELLING asked whether it is not the custom of the Society to inform the gentlemen who are proposed as councillors of that fact, and ask whether they are willing to serve. He was surprised to see his name down on the list.

The PRESIDENT apologised for this unfortunate oversight. It was a courtesy due to all members of the council who are up for election.

The ballot was then declared closed, and Mr. Thompson and Mr. Highton were selected as scrutineers for the evening, to act with the president elect, Dr. Sim Wallace, who would declare the result of the postal ballot in due course.

Casual Communications were then called for.

Mr. Harold Chapman gave the following:—

#### REPORT OF MR. C. R. FITCH'S CASE.

The communication I am making to you this evening is a case under the care of Mr. C. R. Fitch, of Southport. Some time ago he showed me the models, and it struck me at once as a most suitable casual for this Society; on suggesting this to Mr. Fitch, he readily assented and I am greatly indebted to him, not only for permission to bring it forward, but also for the history and models of the case.

The patient, a boy, was seven years and nine months old at the commencement of treatment.

A study of the occlusion is seen to put the case in Class I. (Angle); on the left side the occlusion of the teeth is normal both mesio-distally and bucco-lingually, on the right side the mesio-distal relation of the upper and lower teeth is normal, but the upper teeth from the first permanent molar to temporary canine are all in lingual occlusion with the corresponding lower teeth as shown in Fig. 1.

Fig. 2 shows the occlusal views of the same models; the lower jaw, it will be noticed, is seen to be well developed, although perhaps not quite sufficiently for the age, still very little treatment will suffice to give sufficient room for the permanent teeth that remain to erupt; the upper jaw, however, is seen to be considerably cramped, and together with the lopsidedness of the lower jaw (mentioned below), accounts for the lingual occlusion of the teeth on this side.



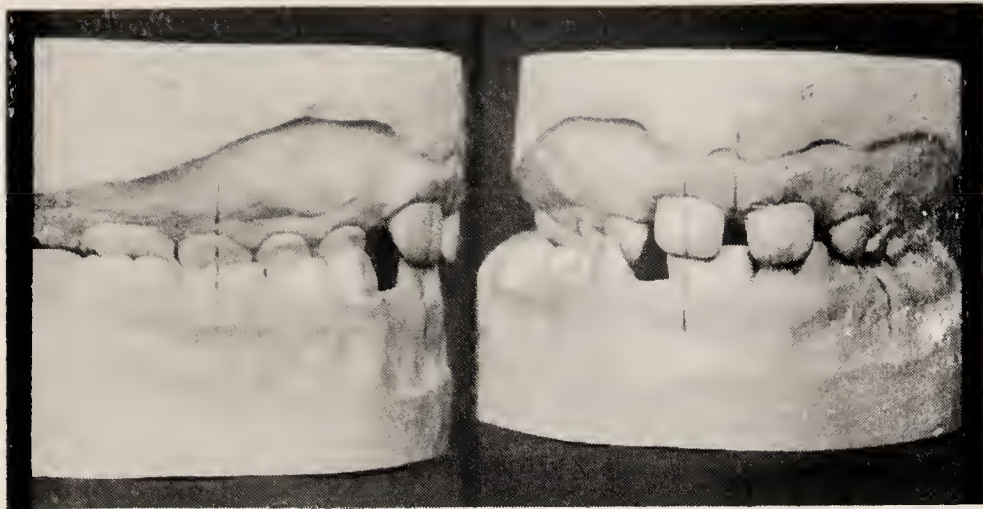


FIG. 1.

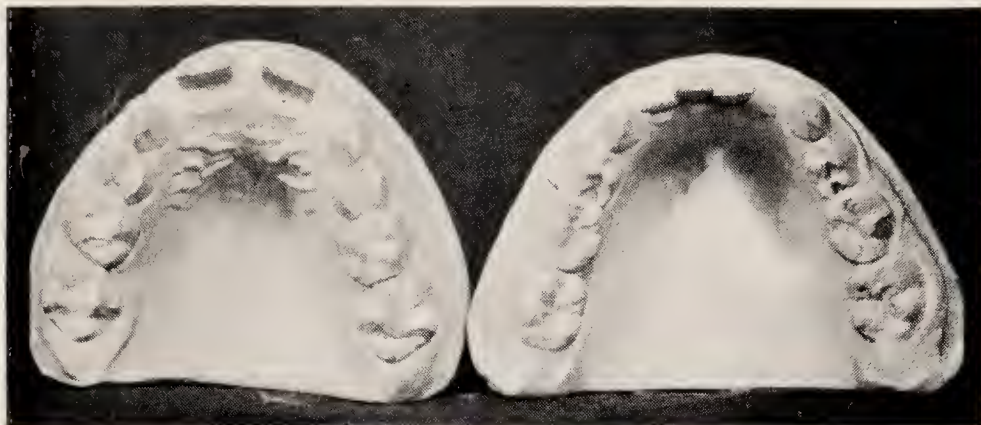


FIG. 2.



FIG. 3.

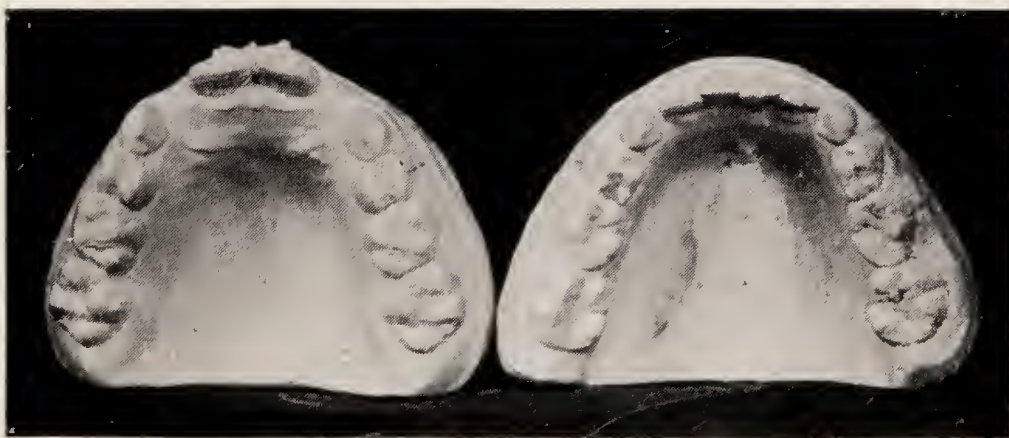


FIG. 4.

TO ILLUSTRATE MR. CHAPMAN'S COMMUNICATION.





As regards the facial appearance I will quote Mr. Fitch's own words:—"The boy's face was quite lop-sided, the lower jaw being slewed round to the right." The models shown in Fig. 3 were made just before the case was retained; they were taken four months after the commencement of treatment. (During two of these four months the case was retained while the patient was on holiday.) From Fig. 3, it is seen that the upper dental arch has been considerably improved in shape and that the lingual occlusion has been corrected, normal arrangement of the teeth resulting. Fig. 4 shows the occlusal views of the same models; very little treatment of both jaws—expansion both forward and laterally—will now ensure the development of a perfect occlusion. The patient's face is quite symmetrical; the upper central incisors are in contact and, since the taking of the impressions, have become the same length, the centre vertical line is not quite but very nearly correct.

The course of treatment, details of which Mr. Fitch has sent me, was as follows:—The case has been treated by plates throughout; the first was for expansion by Coffin's method, it covered the occlusal surfaces of the teeth on both sides, the surfaces of the plate, which may be called the occlusal surfaces, took the form of planes inclined from right to left starting from the higher plane and were made to articulate well with the lower teeth. The object of this arrangement was to slew the lower jaw round to the left coincidently with bilateral expansion of the upper jaw. This plate was worn twelve days and established the habit of closing the lower jaw more over to the left. The second plate, an ordinary Coffin expansion plate, was worn for the three weeks following. The next plate, similar to the last, was worn only three or four days, after which the case was retained during seven weeks' holiday; then the previous plate was resumed for ten days. Two more similar plates were used for four weeks, after which it was considered that sufficient expansion had been obtained. The springs on all the plates were opened out at intervals. The upper central incisors were brought together with wire ligatures. This case undoubtedly emphasises the importance of early treatment wherever it is possible. One cannot but believe that the deformity and malocclusion would be perpetuated, and perhaps increased, on the eruption of the permanent teeth had treatment not been instituted. The point of great interest, however, is that Mr. Fitch has treated the case not by unilateral expansion of the upper jaw as on casual observation one would deem to be the correct method, but by bilateral expansion of the upper jaw and by slewing round the mandible to the left, a movement which, I am assured, was accomplished with the greatest ease, and from the point of view of comfort, one that was much appreciated by the patient.

The PRESIDENT had a few slides which bore on Mr. Chapman's communication.

#### I. Case of right unilateral lingual occlusion.

##### 1A. Same after ten months.

This is another case of lower incisors appearing before the first permanent molars. Constantly at five years old one finds the lower incisors appear before the first molars.

2 and 2A. This is a case of lingual occlusion that had not been treated. The patient had paralysis at the age of three. This model was taken at five years and two months.

3. This is a case of bi-lateral lingual occlusion, and a curious thing was that the child was aged eight and the molars were still unerupted. But directly expansion was started, they erupted, and the plate had to be changed to include them. The Badcock screw was used in this case. It seems a great shame after Mr. Badcock has taken all the trouble to introduce such an excellent thing as this screw, that the manufacturers should make them so badly.

4. This case of lingual occlusion includes the upper right lateral as well. The child is  $6\frac{1}{2}$  years of age, and she has not yet the six year old molars. This case is under treatment.

With regard to Mr. Chapman's communication, he very strongly deprecated covering the occlusal surfaces of the teeth for any conditions whatever, and it was doubtful if Mr. Fitch swung the jaw round at all. These cases seemed to take their normal positions immediately the pressure from the upper jaw was relieved.

MR. BADCOCK: In these cases of lingual occlusion was there any sucking habit?

PRESIDENT: Unfortunately this point was not fully enquired into.

MR. BADCOCK: One other point. What method do you adopt when you wish to push a tooth out of lingual occlusion into normal on one side only? The expansion of one side of the jaw without the other to me presents difficulties.

PRESIDENT: In the case of one of those children, the method I adopted was to put the Badcock screw close up to the molars, on one side, and then cut a very small section on the one side, so that one end of the screw was contained in three-quarters of the plate, and the other end contained in one-quarter of the plate, but it was not found to work very well. There certainly was more expansion on one side than the other, but as a rule both sides go out together.

MR. BADCOCK: One method I have found to be fairly successful, is to use a vulcanite plate with screws against the instanding teeth. I always have my screws made of such a length that when they are screwed down to the full they are just long enough—they cannot be overscrewed.

The PRESIDENT then called on Mr. Highton for his Casual Communication.

MR. HIGHTON gave a preliminary note of a device to be used in connection with a vulcanite case for the expansion of the arch.

It might be termed an eccentric screw with an internal mechanism, which is being perfected and will be explained at a future meeting. The device has the advantage of being small and fitting closely into the plate, is easy of application, simple to use, and can be attended to either by the patient or operator. Whilst in use it will not slip back as the expansion is brought about by points attached to arms, which travel in a definite path around a central point, and lateral pressure cannot alter their position.





FIG. 1.  
RIGHT UNILATERAL LINGUAL OCCLUSION.



FIG. 1A.  
SAME AFTER TEN MONTHS.

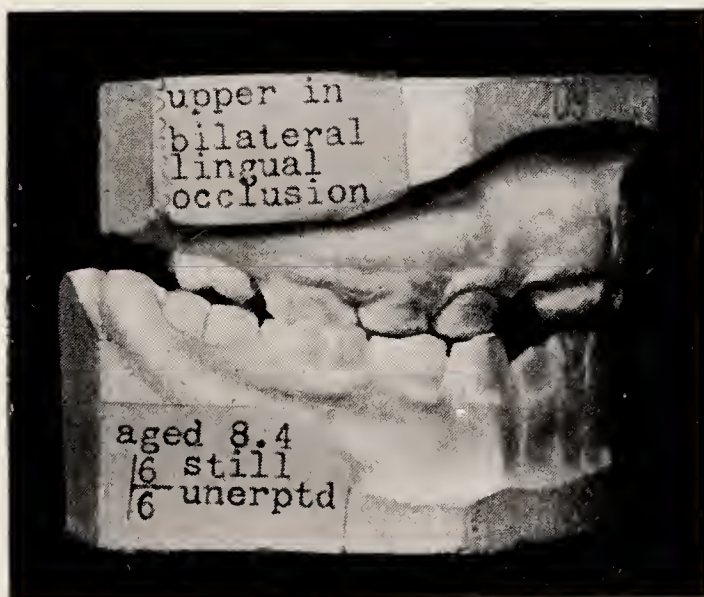


FIG. 2.  
LINGUAL OCCLUSION.

TO ILLUSTRATE MR. NORTHCROFT'S COMMUNICATION.

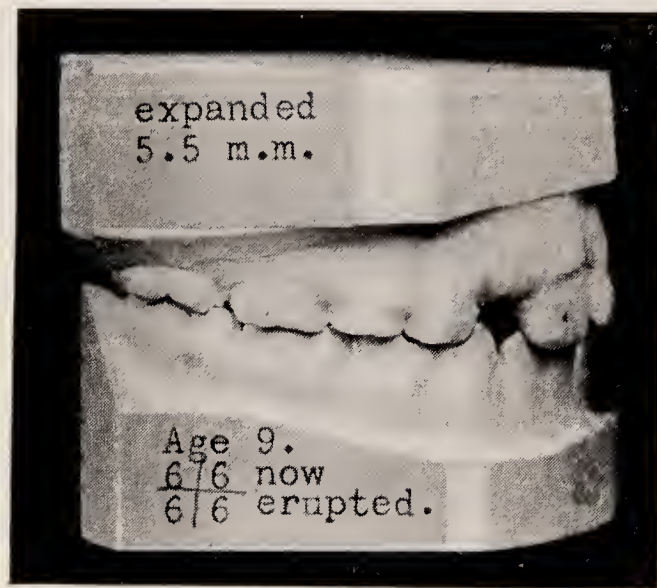


FIG. 2A.  
SAME CASE TREATED.

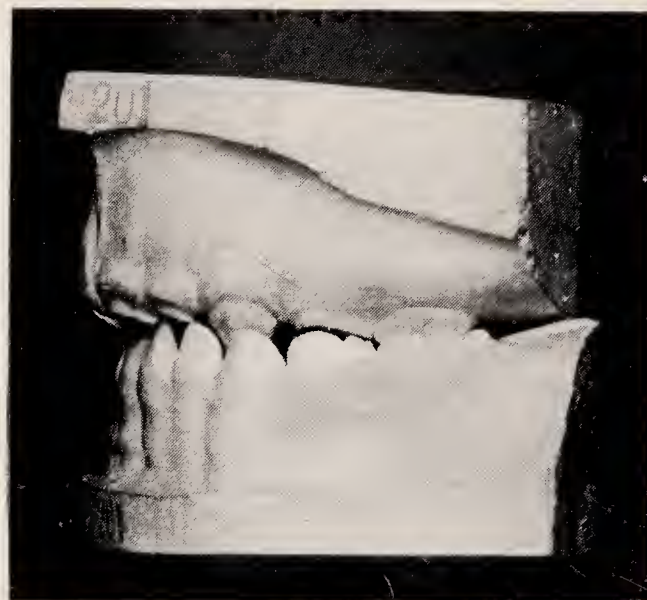


FIG. 3.  
BI-LATERAL LINGUAL OCCLUSION.

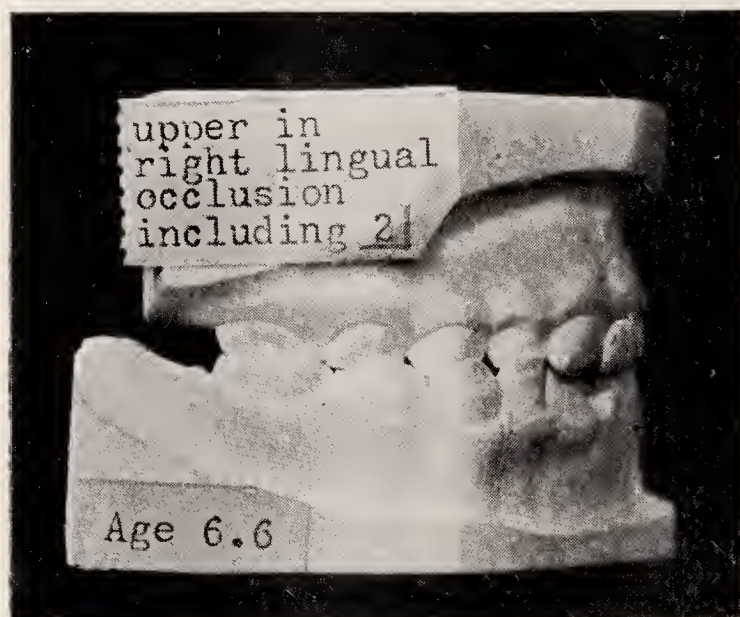


FIG. 4.  
LINGUAL OCCLUSION.

TO ILLUSTRATE MR. NORTHCROFT'S COMMUNICATION.



The PRESIDENT said they must feel extremely indebted to Mr. Highton for bringing forward his communication. He feared he was guilty of inducing him to bring it forward in an unfinished state, because he thought it a very good idea, and the members could watch for its appearance on the market as soon as it was ready. It seemed to contain very many advantages, and Mr. Highton must demonstrate its use at one of their demonstration meetings. It seems that Mr. Highton rather drew his bow at a venture when he stated one could expand one side more than the other. The pressure on both sides must be equally distributed. At the same time it was delightful to have such inventive members among them, and they were indebted to Mr. Highton for bringing his idea forward.

The PRESIDENT then gave his

### VALEDICTORY ADDRESS.

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Farewells are always irksome amongst friends, and my leave-taking as your President shall be made as brief as possible. It seems appropriate, however, to spend just a few moments in rapidly reviewing the events of the past year, and note if we have made progress, merely marked time, or are lagging behind.

Have we made any definite advances in our knowledge of the special subject in which we are interested, either theoretically or practically?

It must be confessed, if there has been any advance, it has been very small. We have been warned of the great dangers of the unscientific removal of teeth for the correction of irregularities, have noted the great possibilities of X-ray work with plates used outside the mouth. Again, had the necessity of breadth of outlook brought home to us, and of the wisdom of working in conjunction with our medical confrères, lastly, the complicated subject of heredity has been before us, and should continue to claim our attention. But have we taken enough advantage of the knowledge already at our disposal? It is to be feared that our librarian has had few calls on his willing energies.

We hope next year that our museum may be in such an advanced state that it will prove of great value to members at each meeting.

You have heard our Secretary's wish that more members would take an active part in the preparation of material for presentation before this Society, and I have taken the liberty of reproducing as types, and as a guide for future study, four of the questions propounded at the International Congress at Berlin, to which we want definite answers.

1. Does the classification of malocclusions, as suggested by Angle, fulfil the requirements of a scientific system for the division of anomalous relations of teeth and jaws?

2. Is Angle's hypothesis tenable, that nature, in determining the position of the first molars, uses the greatest care, and almost never varies that of the first upper molar?

3. What ages are favourable for the beginning the treatment in

cases of "bilateral distal occlusion"? (Or "Double post-normal occlusion," which is the term I hope to see adopted in this country at any rate.)

4. What operative interference is indicated in cases of diastema of the frenum labii?

It should not be too difficult to find a solution to these problems, and even if inconclusive, surely the discussion would, as it were, clear the air, and advance our knowledge appreciably.

In turning over our transactions one point is brought out very clearly, that is, the constant repetition of the same names in taking part in the discussions; this has been so noticeable, that one sometimes began to lose faith in the enthusiasm of the members and to wonder if indifference to the questions at issue was not evident. Now, good discussions are very educating, and a man learns a very great deal when trying to teach someone else; the more intimately one knows a subject the more readily can it be debated, and it would be a very healthy sign of progress if more members joined in debate. More work would necessarily be thrown on the broad shoulders of our Editor, for it would be undesirable that *every* remark should appear in the Transactions, but with this knowledge shyness should disappear. To facilitate freedom of discussion your Council have also thought wise to make the meetings a little less formal in character, and to inaugurate a conversational style of debate which will be both time-saving and instructive. We had intended always to have the papers printed and distributed at least a week before the date of the meeting, to promote well thought out and sound criticism, but this was though impracticable by some, and is a subject worth reviewing once more by your Council. Another innovation to be introduced is that of insisting on models being displayed with lantern slides, but unless contrary to the wishes of the member presenting the communication, the Society shall pay for, and own, the slides. It will be seen what a reasonable attitude this is, and how much healthy discussion will thereby be stimulated.

All that now remains is for me to sincerely apologise for my many sins of omission and commission while presiding over you, and to tender my warmest thanks to all those who have so heartily and loyally supported me and made my year of office so pleasant.

Let us all strive to be studious in our search for truth, for truth must prevail. In the coming year I ask you to give as hearty support to one who is so well known among us as an earnest seeker after truth.

Dr. Sim Wallace, in vacating this chair, and in welcoming you to the honourable position you now occupy, rest assured that your task will be rendered easy by the loyal support of your officers, and my sincere wish is, that when your term as President is ended, you may look proudly back on your term of office as one in which much was accomplished towards the elucidation of those problems which so deeply interest us all.

DR. SIM WALLACE then took the president's chair.

On taking the chair, DR. SIM WALLACE said he thanked Mr. Northcroft for his kind remarks, and deeply appreciated the honour



that had been conferred upon him. He would be addressing the next meeting, and perhaps would be able to say then what he might have omitted now.

MR. RUSHTON : I am sure we cannot close this session without thanking very heartily Mr. Northcroft,—our President for that session,—for the extremely able way in which he has performed his duties, not only in this room, but in the other room in which we hold our council meetings. He has always been business-like and courteous and we have had a very happy time during the period he has been in the chair.

MR. NORTHCROFT thanked Mr. Rushton for his extremely kind words, and felt that his sins of omission and commission had been many : but they were all human. These sins were not intentional, and he trusted they would be generously overlooked.

A very hearty vote of thanks was then proposed, acknowledging the able services of hon. treasurer, hon. secretary, and all the other officers of the society.

The discussions were declared closed, and Mr. Chapman, and Mr. Highton thanked for bringing forward their Casual Communications.

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The following are the officers for 1910 :—

*President* : Dr. J. Sim Wallace.

*Vice-Presidents* : M. F. Hopson, G. Campion, W. Rushton.

*Immediate Past President* : G. Northcroft.

*Councillors* : H. Baldwin, E. R. Tebbitt, C. Schelling.

*Hon. Treasurer* : W. F. Mellersh, 28, Wimpole Street, W.

*Hon. Secretary* : A. C. Lockett, 10, Harley Street, W.

*Curator* : Hedley Visick.

*Editor* : W. Rushton.

*Librarian* : J. E. Spiller.

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## DEMONSTRATION MEETING.

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At the Demonstration Meeting held in May the following were shown and demonstrated :—

A Prosopometer and a Note on Prosopometry. By DR. SIM WALLACE.

A Modification of the Jackson Crib. By MR. C. S. MORRIS.

A Pair of Measuring Calipers. By MR. HAROLD CHAPMAN.

A Device for the Rotation of Molars. By MR. WILTON THEW.

A New Mouth Blow-pipe. By MR. A. C. LOCKETT.

A Plastic Plane and Blade Sharpener. By MR. HEDLEY VISICK.

Plaster Impressions of the Face By MR. J. E. SPILLER.







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